DOCUMENT RESUME

ED 273 347 JC 860 508

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TITLE	Community Colleges and Apprenticeship Training: A Winning Partnership.
PUB DATE	Oct 86
NOTE	190p.; Paper presented at the Annual Conference of the National Council for Occupational Education (12th, San Diego, CA, October 15-18, 1986).
PUB TYPE	Reports - Descriptive (141) -- Speeches/Conference Papers (150)
EDRS PRICE	MF01/PC08 Plus Postage.
DESCRIPTORS	*Apprenticeships; Community Colleges; *Cooperative Programs; *On the Job Training; Program Descriptions; *School Business Relationship; Two Year Colleges; Vocational Education
IDENTIFIERS	*San Juan College NM

ABSTRACT

In 1984, a partnership was developed between San Juan College (SJC) and the Public Service Company of New Mexico's (PNM) San Juan Generating Plant. An agreement was reached to promote training through a planned educational experience in which SJC awarded credit for courses taught by PNM training personnel. The program began in response to the need for an industrial instrumentation program that would meet PNM's needs, and proved so successful it was expanded into apprenticeship programs in eight crafts. This expansion involved the development of curricula for each craft; the establishment of associate of applied science degree programs; the preparation of an informational handbook, job training sheets, class/work schedules, and progress/status sheets; and the establishment of policies and procedures. In light of the success of this partnership program, in 1985 SJC entered into a partnership with the Arizona Public Service Company to provide training for apprentices in the electrical, instrumentation, and machinist crafts and established an Industrial Management program at PNM to serve blue collar as well as low and mid-management employees. SJC is continuing the development of its partnerships, looking at clerical positions, security guards, management, and childcare as possible areas for future program development. (EJV)

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"COMMUNITY COLLEGES AND APPRENTICESHIP TRAINING — A WINNING PARTNERSHIP"

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Submitted for: THE NATIONAL COUNCIL FOR OCCUPATIONAL EDUCATION'S TWELFTH ANNUAL CONFERENCE

TOWN AND COUNTRY HOTEL
SAN DIEGO, CALIFORNIA

Conference Theme: "LINKAGES FOR PARTNERSHIP IN ECONOMIC AND HUMAN RESOURCES DEVELOPMENT"

JC 860 508

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PREFACE

We feel that the following partnerships between San Juan College, Public Service Company of New Mexico, and Arizona Public Service Company can easily be adapted by other community and junior colleges. Therefore, we are approaching this abstract with the idea of other community and junior colleges utilizing this information as a model. We encourage fellow educational institutions to inquire for additional information and guidance regarding establishing a similar partnership(s) in their service areas.

ACKNOWLEDGEMENTS

A special commendation is extended to the following individuals who were directly responsible for initiating this partnership between business and industry and education:

Dr. James Henderson, President, San Juan College
Mr. Jerry Godwin, Manager, PNM-San Juan Plant
Mr. Gerald Nix, Dean of Instruction, San Juan College
Mr. Denver Bearden, Training Director, PNM-San Juan Plant
Dr. Robert Huddleston, Former Vocational Dean, San Juan College

INTRODUCTION

In January of 1984 an exciting partnership developed between San Juan College, Farmington, New Mexico, and Public Service Company of New Mexico's San Juan Generating Plant. An agreement between San Juan College and Public Service Company of New Mexico (San Juan Plant) was reached to promote training through a planned educational experience. (Appendix 1). The major thrust of the agreement was San Juan College awarding college credit for approved courses taught by PNM training personnel on their site. PNM employees participating in the four-year apprenticeship program now were afforded the opportunity to earn college credit upon successful completion of apprenticeship training classes. An Associate of Applied Science degree program was subsequently established for eight apprenticeship training crafts at the San Juan Plant.

HOW IT ALL GOT STARTED

The need for San Juan College and Public Service Company of New Mexico to join in a partnership was created in 1982 when the San Juan Plant Training Director realized that the Industrial Instrumentation program at the college was not meeting the needs of the power industry. The college had an exceptional laboratory with excellent teachers; however, the specific coursework needed by the two local power plants for their instrument apprentices was not being supplied.

With the cooperative efforts of the College President, Dean of Instruction, Associate Dean of Occupational Programs, and the San Juan Plant Manager and Training Director, a solution to this problem was derived. The curriculum at the college was modified to meet the needs of PNM. An Industrial Instrumentation curriculum was established, to be taken over a four year period (length of apprenticeship), including eight courses tailored to meet the needs at the plant. PNM was to supply the students and SJC faculty would provide instruction. This was the beginning of what has proved to be a winning partnership.

THE NEXT STEP: APPRENTICESHIP TRAINING

The Instrumentation Program worked so well that it was decided to explore creating a college program for the apprentices in the remaining seven crafts. Since PNM already had full-time instructors for each craft, it was decided to certify them through the New Mexico Department of Education. This was accomplished by granting the instructors a provisional teaching certificate, which is renewable on a yearly basis and requires no upgrading. Subsequently, they were "hired" as adjunct instructors for SJC (this will be explained later) and the program was well on its way.

DEVELOPING THE PROGRAM

STEP 1 - The curriculum was developed along with a syllabus for each course in each of the eight crafts. (Appendix 2) Performance objectives and methods of evaluation were included for each course.

STEP 2 - Associate of Applied Science degree programs were established for each of the crafts.

STEP 3 - An informational handbook was developed that explained the entire A.A.S. degree program that was established only for PNM employees. (Appendix 3).

STEP 4 - On-the-job training sheets were developed for the employee to keep a running record of hours worked in the various areas of the plant. (Appendix 4). An employee can earn up to four credit hours for each year of their apprenticeship that is successfully completed. OJT sheets must be submitted to the Co-op Director each month.

STEP 5 - Policies and procedures were established to serve as guidelines for PNM/SJC instructors. (Appendix 5).

STEP 6 - It was determined that all of the classes would be taken outside of the apprentice's forty hour work week.

STEP 7 - Procedures were established for registering the apprentices in courses under the open entry-open exit program referred to as the Extended Course program. Procedures were subsequently established for grading the apprentices. (Appendix 6).

STEP 8 - Apprentice course progress/status sheets were developed for the purpose of keeping accurate records of apprentices progressing through the program. (Appendix 7).

TUITION AND INSTRUCTOR REIMBURSEMENT

The college bills PNM at a rate of $15 per credit hour plus a $10 one-time admission fee. PNM pays for all courses that are taught as a requirement of the apprenticeship program. The apprentice must participate in the PNM reimbursement program when enrolling in other courses. PNM is reimbursed for instruction as their training instructors are employed as adjunct instructors by San Juan College. The college reimburses PNM $350/credit hour/course. The reimbursement is contingent on sufficient enrollment for each individual class. The minimum number of students per class for full payment is ten. In situations where classes have less than minimum enrollment, the college pays PNM a prorated amount.

Apprentices are graded and registered in courses three times per year: December 15, April 15 and July 15. Following each grading/registration period, a bill is sent to PNM for tuition along with a check for teaching reimbursement. PNM pays for the tuition out of the training budget, but also credits the same budget for the reimbursement check. Virtually a break-even situation has been created. A winning partnership!

OTHER SPECIFICS REGARDING THE PARTNERSHIP

1. Each course taught at PNM is designed as a one-year course as that is how the apprenticeship program is structured.

2. Apprentices are not able to retroactively enroll in a course they have completed. A challenge examination is issued.

3. PNM instructors cannot challenge their own courses to obtain an A.A.S. degree.

4. Individual courses are not listed in the Fall, Spring and Summer schedules. There is a brief description of the program in the college catalog; however, courses are not listed.

A PARTNERSHIP WITH ARIZONA PUBLIC SERVICE COMPANY IS CREATED

In July of 1985, San Juan College entered into a partnership with Arizona Public Service Company to provide training for apprentices in three crafts: electrical, instrumentation, and machinist. This partnership differs from the one with PNM in that San Juan College provides all of the instruction on campus in the evenings. The apprentices work an eight hour shift at the plant and attend courses two nights each week. They earn cooperative education credits while accomplishing established performance objectives on the job. An A.A.S. degree program was also established for the APS apprentices (Appendix 8). Since APS has a three year apprenticeship program, the apprentices are required to take more classes after completing the apprenticeship than are the PNM employees, who participate in a four-year program. Again, for record-keeping purposes, progress/status sheets were developed (Appendix 9).

THE INDUSTRIAL MANAGEMENT PROGRAM

In September, 1985 an Industrial Management program was established at PNM. It was requested by several low and mid-management employees. However, many blue collar workers enrolled also. A similar program was initiated at APS in January, 1986. Both programs are A.A.S. degree programs (Appendix 10 and 10-A). All management courses will be taught at the two plant sites (approximately 25 miles from campus) by the college staff. The general academic courses will have to be picked up by the employees at the college. Enrollment in both programs is very good and is expected to increase in the future.

WHAT NEXT?

We at San Juan College pride ourselves on being innovative and are constantly striving to meet the needs of our community, particularly business and industry. Currently we are in the midst of researching implementation of several new programs. PNM has expressed a need to upgrade and train employees in clerical positions. We are going to propose to APS and PNM that the security guards (TATT Security Company) need training and upgrading. A security guard academy on campus is a possibility. The local Wastewater Association has approached us for assistance in training and we are meeting that need by developing a one-year certificate and possibly an A.A.S. degree program. We have recently received permission to proceed to work with the State's Police Academies to award college credit for a certificate program. Soon we will be opening a Business Assistance Center in the downtown area with other community agencies interested in promoting economic development in the county. As part of this, the college is also researching developing an Agri-Business Management program to help local farmers and ranchers and the Navajo Agricultural Products Industry (NAPI), an important employer in the county.

The need for child-care in the county has been determined to be acute. The college will respond to this need this fall by establishing a comprehensive Early Childhood Program which incorporates credit and non-credit courses, CDA credentialing, parenting and in-service for child-care workers. The region is also rich in archaeology and the college sponsors a contract archeology program which is soon to become an instructional program.

All of these programs will definitely help meet the needs of the citizens of our service area. We at San Juan College are proud to be involved in so many winning partnerships and would be happy to share our winning ideas with other institutions.

APPENDIX 1

AGREEMENT

This is an Agreement between Public Service Company of New Mexico (San Juan Plant), and San Juan College, herein referred to as the College. The objective of this written agreement is for the mutual benefit of both parties in promoting training through a planned educational experience. Both parties recognize there are certain responsibilities to fulfill in order for the above objective to be accomplished.

1. San Juan College will provide credit for approved courses to Public Service Company of New Mexico (San Juan Plant) taught on site.

2. San Juan College will award the Associate of Applied Science Degrees in approved programs to employees of Public Service Company of New Mexico (San Juan Plant) that satisfactorily fulfill all requirements of the A.A.S. Degree.

3. The College will assist in the curriculum development and flexible class scheduling for all approved programs.

4. The College will allow PNM employees to challenge courses as prescribed in the San Juan College catalog.

5. The College will offer general education courses at the San Juan Plant to facilitate PNM employees in obtaining their A.A.S. Degree. These courses will be offered contingent on sufficient enrollment, availability of a qualified instructor, and approval by the Dean of Instruction.

6. The College will have the right to monitor all courses/programs and instructors in cooperation with the training department of the San Juan Plant to insure the goals and objectives of all progrms and courses are upheld.

7. The College agrees to reimburse PNM a mutually agreeable fee for instruction.

8. The College will not allow instructors to register in their own classes or challenge their course exams and receive credit.

9. Public Service Company of New Mexico (San Juan Plant) will insure that all courses/programs taught by their instructors will adhere to the prescribed curricula as adopted by San Juan College.

10. All instructors of PNM (San Juan Plant) will follow the procedures as established in the Part-Time Instructor's Handbook to insure quality instruction. This specifically includes the grading procedures and that each student will earn the appropriate grade according to his/her competency as related to the objectives of each course.

11. San Juan Plant supervisors will participate in the Cooperative Education Arrangement so that each student's on-the-job training effort can be evaluated according to the pre-arranged objectives that will be established among the student, the student's supervisor and the College Coordinator.

12. San Juan Plant - Training Department will inform the College Representative of any programmatic changes in any program or courses.

13. All PNM instructors will insure that all classes meet the specific number of minutes as established on each course syllabus.

Dr. James Henderson, PResident

San Juan
College

MEMORANDUM

To: PNM

From: Bob Huddleston

Date: November 1, 1983

Subject: San Juan College Payment to PNM

The College agrees to contribute $300/credit hour/course to PNM (San Juan Plant) in support of instruction. This reimbursement is contingent on sufficient enrollment for each individual class. In situations where classes have less than minimum enrollment, the College agrees to pay PNM a prorated amount.

The minimum number of students per class for full payment is 10.

BH:ctc

San Juan
College

MEMORANDUM

TO: Gerald Nix

FROM: Bob Huddleston BH

DATE: October 19, 1983

SUBJECT: Associate Degree Programs - PNM

I wanted to write down the comments concerning our meeting with Dr. Henderson and Mr. Zaffke.

1. **Should there be a written agreement between SJC and PNM on the entire cooperative arrangements?**

   Yes, there should be a letter of agreement between San Juan College and Public Service Company of New Mexico. The letter of agreement should state what we are going to do and what is expected of the plant.

2. **Each plant course is designed as a year course - how will this work with Student Services (i.e. grading, FTE count, etc.)?**

   There was discussion concerning the possibility of using an incomplete grade or in progress to satisfy the unusual length of the courses. Mr. Zaffke encouraged the Plant attempt to follow our calendar year. Mr. Zaffke stated he would get back to us before he left on vacation.

3. **Will students be able to retroactively enroll in a course they have completed? If so, we should require a challenge exam.**

   Students will not be able to retroactively enroll in a course, but students will be able to challenge the current exam to receive credit for the course.

4. **Can an instructor challenge his own courses so he can obtain an A.A.S. Degree?**

   No! Instructors may be able to challenge a more difficult program if the curriculum can be developed.

5. **Who will work with the BEF to see that these courses are approved?**

   The decision here was to inform both the Board of Educational Finance and the Department of Vocational Education by writing them a letter explaining the programs.

6. **Are we required by an agency to compensate the instructors?**

   Mr. Zaffke will get some information in this matter.

7. **Do we not want the courses listed in the Fall, Spring and Summer schedules?**

   No.

8. **Do we want these courses listed in the catalog?**

   No. The group believed it to be appropriate to have a general description of the program in the catalog, but have the course outlines and descriptions on file in the Office of the Dean of Instruction.

We would strongly encourage PNM employees not to allow their students to receive GI benefits for this program.

BH:ctc

Copy to:
Dr. Henderson
Karl Zaffke

APPENDIX 2

CHEMICAL PLANT OPERATIONS

CHPL 110	5
CHPL 180	5
CHPL 210	5
CHPL 260	5
Cooperative Education	16
CHPL 280 - 4 Credits CHPL 282 - 4 Credits CHPL 284 - 4 Credits CHPL 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition - 3 credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students OR any Math course higher than MATH 113 - 3 Credits SPCH 110 - Public Speaking OR SPCH 111 - Speech Communications - 3 Credits	
Power Plant Overview	7
CHPL 270 - 1 Credit CHPL 272 - 2 Credits CHPL 274 - 2 Credits CHPL 276 - 2 Credits	
Electives	4
Total Credits	62

SYLLABUS

Date of Origin: 7/8/83
Review Date: ____________

1. Course Number CHPL 110/SCOP 110 Title Chemical Plant Operations I/ Scrubber Operations I
   Credit Hours 5 Total lecture/recitation hours 75
   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   This is the initial course in the program and deals with basic mathematics and applied science, auxiliaries, and plant operations emphasizing pollution control systems.

3. Goals:

   The student will become familiar with the operation of a power plant with an emphasis in understanding pollution control systems.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a general understanding of how mathematical operations are performed, how quantities are expressed in relation to other quantities, and how algebraic equation, formulas, and graphs are used to evaluate plant operating conditions and solve problems involving calculations. The trainee will be able to apply learned skills to calculate conditions and solve various problems relating to plant equipment and system operations.

B. Have a understanding of how energy is converted from one form to another in a power plant. They will be familiar with terms such as mass, weight, density, specific gravity, specific volume, viscosity, temperature, and pressure; and they will understand when and how the properties of matter may change. They will be able to read pressure and temperature measurements on a variety of scales, and they will be able to make conversions between pressure units and between temperature units.

C. Have a general understanding of how fluid flows through piping systems and the effect of various types of valves, traps, and strainers on the flow of fluids. They will be familiar with the construction and operation of centrifugal pumps, positive displacement pumps, compressors, fans, and heat exchangers.

D. Have a general understanding of how a power plant produces and distributes electricity. They will know how water and steam flow through the steam cycle in their plant, and they will be familiar with the operation of their plant's boilers, turbines, and condensers and the support systems associated with those major components. They will also have a basic understanding of a plant operator's general responsibilities in normal situations and under emergency conditions.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Projects
Field Trips

Originator Signature ______________________

Division Head ______________________

SYLLABUS

Date of Origin: 7/8/83
Review Date: ____________

1. Course Number CHPL 180/SCOP 180 Title Chemical Plant Operations II/ Scrubber Operations II

   Credit Hours 5 Total lecture/recitation hours 75

   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Basic water chemistry, water treatment equipment, plant instrumentation, and plant cycle.

3. Goals:

   The student will have an understanding of how plant systems are affected by water and how the indicating instruments in their plant operate.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a general understanding of how plant systems are affected by water and how water is treated to minimize problems such as corrosion and fouling. They will know how the elements in water react with other substances and what happens when water mixes with chemicals. They will also have a basic understanding of how impurities are removed from water that is used in plant systems.

B. Have a general understanding of how water used in plant systems is treated. They will know how clarifiers, filters, reverse osmosis units, evaporators, zeolite softeners, condensers, de-aerators, and ion exchangers operate, and they will be familiar with the purposes of various chemicals used in the water treatment process. They will know how suspended solids, dissolved solids, and dissolved gases are removed from or controlled in plant water systems, and they will know how the problems caused by corrosion, erosion, scale formation, and biological fouling are minimized.

C. Have a general understanding of how the indicating instruments in their plant operate. They will be able to read various types of gauges and they will understand how information is transmitted from one location to another. They will also be able to interpret the symbols found on Piping and Instrumentation Drawings (P and ID's).

D. The trainees will understand what the plant cycle is and how the properties of water and steam change as fluid flows through the various plant cycle components. They will know how the properties of water and steam are affected by changes in temperature and pressure, and they will know how some of the problems associated with temperature and pressure can be avoided. They will be able to look up values for the properties of water and steam in the steam tables.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Projects
Field Trips

Originator Signature ______________________

Division Head ______________________

SYLLABUS

Date of Origin: 7/8/83
Review Date: ____

1. Course Number CHPL 210/SCOP 210 Title Chemical Plant Operations III/
   Credit Hours 5 Total lecture/recitation hours 75
   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Plant systems, basic electricity, fuel and combustion and boilers.

3. Goals:

   The student will have a basic understanding of electrical theory, boilers, plant systems components, various circuits, and fossil fuels.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 68%

6. Objectives: The student will:

A. Have a general understanding of basic electrical theory and the principles of operation of devices such as batteries, generators, motors, transformers, solenoids, relays, fuses, and circuit breakers. They will be familiar with many of the terms that relate to the production and use of electrical power, and they will appreciate the importance of producing and using electrical power safely and effectively.

B. Understand the operation and function of components found in typical plant systems, and they will know how water and steam flow through these systems. They will be familiar with the symbols used to represent various components on system diagrams, and they will know some of the operator checks that they may be responsible for in maintaining efficient operation of plant systems and components.

C. Be able to explain the steam and water circuits, the air and fuel circuit, the safety and protective devices on boilers, and boiler efficiency.

D. Have a basic understanding of the four requirements for combustion and why fossil fuels burn. They will also have a basic understanding of the components and systems used by their plant for the delivery, transfer, and processing of fuel for use in their plant's boilers and the equipment for handling ash; and they will have a general understanding of a plant operator's responsibilities for checking and maintaining a fuel or ash handling system.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 7/8/83
Review Date:

1. Course Number CHPL 260/SCOP 260 Title Chemical Plant Operator IV
   Scrubber Operations IV

   Credit Hours 5 Total lecture/recitation hours 75

   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Environmental protection, systems flow and control.

3. Goals:

   The student will understand pollution control, design conditions, and various types of equipment critical to scrubber operations.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a general understanding of why pollution control is important and how it is accomplished by power plant systems and equipment. They will know how plants prevent waste heat, suspended solids, and chemical wastes from polluting the water. They will know how mechanical separators, electrical separators, filter systems, and scrubbers separate particulates from flue gas before the flue gas is released to the environment; and they will know how the production of nitrogen oxides is controlled and how sulfur oxides are removed form flue gas.

B. Will be able to draw in detail all flows and systems within the plant boundaries. The trainee will know all of the design conditions, the function and purpose of each control valve, all interlocks in the systems, and will be familiar with all Standard Operating Procedures.
NOTE: The specific material presented in this portion will be totally different for the Scrubber area compared to the Chemical Plant Operation.

C. Will be familiar with the materials of construction, the theory and design, the vendor's manuals, and the practical application of the following equipment:

1. Scrubber & Absorber Tower
2. Bird Centrifuges and Sharples Centrifuges
3. Durion Filtration System
4. Evaporators - for process solution and water treatment
5. Turbonetic Compressors
6. Refridgeration Systems
7. Sulfuric Acid Plant

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Projects
Field Trips

Originator Signature ________________

Division Head ________________________

SYLLABUS

Date of Origin: 8/20/83
Review Date:

1. Course Number CHPL, ELEC, FUEL, INME, ININ, POPL, SCOP, WAST 270, 272, 274, 276 Title Power Plant Overview I, II, III, IV

   Credit Hours 1, 2, 2, 2
   Total lecture/recitation hours 105
   Total lab/shop hours 0
   Semester offered Fall, Spring, Summer

2. Catalog Description:

   Interdisciplinary course that requires each apprentice to respond to plant questions dealing with general plant information and material specifics to that individuals trade.

3. Goals:

   The student will research various systems, equipment, and technique to compliment the various on-the-job assignments in each year and to pass appropriate yearly test.

4. Student Responsibilities:

   The student will be expected to:

   A. Research vendor manuals.
   B. Know related safety procedures and limits.
   C. Research diagrams and prints.
   D. Seek additional related information from journeyman and supervisors in both operations and maintenance groups.
   E. Have a thorough knowledge of the assigned tasks and to demonstrate this knowledge in the yearly final on plant questions.

5. Evaluation:

   A. Supervisor must sign off the apprentices' progress indicating satisfactory performance in learning designated skills.

   B. The yearly test covering the field questions will be graded and count as 50% of the yearly grade.

   C. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 58%

6. Objectives: The student will:

A. Have an understanding of materials of construction, and the affect of abrasive and corrosive materials found in a power plant environment.

B. Have an understanding of the safety devices, safe application, safety limits, and safety procedures related to their specific system or equipment.

C. have a general understanding of how each system or piece of equipment affects the plant as a whole unit.

D. Be able to identify an emergency situation, evaluate and take proper corrective action.

7. Learning Activities/Methods of Instruction:

Observation of proper methods
Journeymen directives
Shop demonstrations
Vendor presentations
Self-read instructions
Classroom lecture/application

Originator Signature ______________________

Division Head ______________________

ELECTRICAL PROGRAM

ELEC 110	5 (4+2p)
ELEC 180	5 (4+2p)
ELEC 210	5 (4+2p)
ELEC 260	4 (3+2p)
Cooperative Education	16
ELEC 280 - 4 Credits ELEC 282 - 4 Credits ELEC 284 - 4 Credits ELEC 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition 1 - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students OR any Math course higher than MATH 113 - 3 Credits SPCH 110 - Public Speaking OR SPCH 111 - Speech Communications - 3 Credits	
Power Plant Overview	7
ELEC 270 - 1 Credit ELEC 272 - 2 Credits ELEC 274 - 2 Credits ELEC 276 - 2 Credits	
Electives	5
Total Credits	62

SYLLABUS

Date of Origin: 6/20/83
Review Date: ____________

1. Course Number ELEC 110 Title Electrical Apprenticeship I
   Credit Hours 5 (4+2p) Total lecture/recitation hours 60
   Total lab/shop hours 30 Semester offered Fall, Spring, Summer

2. Catalog Description:

   The course deals with safety, hand and power tools, basic electricity, DC fundamentals, electro-magnetic induction, electrical test equipment, storage batteries, cable conductors and termination.

3. Goals:

   The student will have a basic theoretical understanding and application of electricity and how it relates to a power plant.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a basic understanding of safety practices at the plant. They should know why safety is their concern, what hazards to be alert for, and what precautions and safety equipment are required for each type of hazard.

B. Be able to identify the more common striking and fastening tools and explain the purpose and function of each one. They should also be able to determine the type and size of tool to be used in a given situation and know what to look for when inspecting the tool. The concepts of properly matching a tool to a task and using each tool safely will be emphasized throughout the unit, and the students will demonstrate their knowledge of proper tool care and storage techniques.

C. Have a basic understanding of the purposes of pliers, vises, clamps, and punches; how different types of each are selected for particular jobs; and how each tool is used safely and efficiently. In addition, the students will know when certain tools are not appropriate for given jobs. They will also understand the principles and importance of proper care and storage of pliers, vises, clamps, and punches.

D. Have a basic understanding of the various types of electric and pneumatic power tools used in their plant. They will know how different types of power grinders, power saws, impact wrenches, pipe threading machines, portable drills, and drill presses are selected for particular jobs; and how each tool is used safely and efficiently. In addition, the students will know when each of the tools covered in the unit is not appropriate for a given job.

E. Have a basic understanding of the fundamental relationships between current, voltage, and resistance in a DC circuit. They will know Ohm's Law, Kirchoff's Voltage Law, and Kirchoff's Current Law, and they will be able to calculate basic electrical quantities in series circuits, parallel circuits, and series-parallel circuits.

F. Have a basic understanding of magnetism and electromagnetic theory. They will be familiar with the characteristics of magnetic fields, the factors determining electromagnetic field strength, and Lenz's Law.

G. Have a basic understanding of the purpose and operation of voltage testers, multimeters, clamp-on ammeters, and megohmmeters and the safety precautions associated with the use of electrical test equipment.

H. Have a basic understanding of how lead-acid batteries operate, how they are maintained, and how they are tested to insure safe and efficient operation. By the end of the unit, the students will be able to remove a faulty cell in a lead-acid station battery and safely prepare and install a replacement. The students will also have a basic understanding of the fundamentals of charger operation, and will be able to perform typical maintenance procedures on both lead-acid batteries and chargers.

I. Have a basic understanding of what cables and conductors are and how they are used. They will know how to select a conductor or verify that a conductor is suitable for a particular application, how to splice conductors, and how to terminate conductors at a piece of electrical equipment. The student will also perform the procedure used to pull conductors and cables through conduit.

J. Have a basic understanding of the design, construction and operation of high voltage cables and conductors. They will be able to use a splice kit to splice a conductor, and they will be able to build a splice and a termination by hand. The students will satisfactorily operate the power tools commonly used to prepare larger high voltage conductors for a splice.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 6/20/83
Review Date: ____________

1. Course Number ELEC 180   Title Electrical Apprenticeship II
   Credit Hours 5 (4+2p)   Total lecture/recitation hours 60
   Total lab/shop hours 30   Semester offered Fall, Spring

2. Catalog Description:

   This is a continuation of ELEC 110, introducing concepts dealing with AC fundamentals, transformers, AC & DC motors and generators, and motor protection.

3. Goals:

   The student will gain a better understanding of fundamental electrical concepts and how they relate to the job site.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 68%

6. Objectives: The student will:

A. Be able to solve for unknown voltages, currents, resistances, impedances, inductances, and capacitances in RL, RC, and RLC circuits. They will also be able to calculate the phase angle of any series or parallel circuit. In addition, they will be able to calculate the resonant frequency of an RLC circuit.

B. Understand the basic construction of semiconductor diodes. They will know how current flow through a diode can be controlled, and they will be familiar with the use of diodes as half wave and full wave rectifiers. They will be able to identify the cathode end of various types of diodes; they will be able to use a diode manufacturer's data book to select a properly rated replacement diode; and they will be able to use a multimeter to test diodes to see if they are good or bad.

C. Be able to describe and explain the operation of transformers, rectifiers, filters, regulators, voltage multipliers, and voltage dividers. They will be able to identify these devices and circuits on a schematic.

D. Understand the construction of N-P-N and P-N-P bi-polar transistors. They will know how a transistor is properly biased, how current flows through a properly biased transistor, and how current flow through a properly biased transistor can be controlled. They will also be familiar with the construction of a common emitter circuit, and they will understand how this circuit amplifies an electrical signal. They will be able to identify the leads of transistors by appearance and through the use of a transistor manufacturer's data book, and they will be able to use the data book to select a replacement transistor. Finally, they will be familiar with several types of transistor test equipment, and they will be able to use a digital multimeter to conduct resistance checks on transistors to determine if they are good or bad.

E. Have a basic understanding of the construciton and operation of zener diodes, tunnel diodes, light emitting diodes, light sensing diodes, unijunction transistors, silicon controlled rectifiers, junction field effect transistors, and insulated gate field effect transistors.

F. Be able to use schematic diagrams to recognize the following basic op amp circuit configurations: voltage followers, "inverted" voltage followers, inverting amplifiers, non-inverting amplifiers, differential amplifiers, and instrumentation amplifiers. Given input conditions for these amplifier circuits, they will be able to identify the basic characteristics of op amps and to identify and explain the function of each of the components within the circuits. In addition, the students will be able to recognize the four common op amp package styles.

G. Know how transistor amplifiers operate. They will recognize the three typical transistor amplifier circuit configurations; they will know how they are constructed and biased; and they will be familiar with the amplificaton characteristics of each type. They will also be able to identify the three basic methods of transistor emplifier coupling, and they will know how a multistage amplifier operates. Finally, they will be familiar with a typical procedure for troubleshooting a faulty amplifier circuit, including initial in-unit testing, visual inspection, and signal checks.

H. Understand the basic operating principles of oscillators and how these principles specifically apply to several different oscillators, including the Armstrong oscillator, the Hartley oscillator, the Colpitts oscillator, the phase shift oscillator, and multivibrators. The students will be able to perform simple troubleshooting procedures on a transistor oscillator by applying the techniques discussed in this unit for Armstrong and astable oscillators.

I. Understand how different types of vacuum tubes operate, how tubes are biased, and how amplification is achieved in single-stage and two-stage vacuum tube circuits. They will also be familiar with the schematic symbols and conventions that are used to represent vacuum tubes and circuits. By the end of this unit, students will know how to troubleshoot the filament circuits of faulty vacuum tube circuits that are arranged in parallel and in series.

J. Understand how meters are used to measure DC current, DC voltage, AC voltage, and resistance. They will also know how to measure these electrical properties with a volt-ohm-milliammeter, a vacuum tube volt-ohmmeter, a field effect transistor volt-ohm-milliammeter, and a digital multimeter. In addition, students will also be able to use a transistor tester to measure the Beta characteristics and leakage currents of transistors.

K. Be able to operate an oscilloscope. They will know the function of the major controls in the display section, the vertical section, and the horizontal section; and they will be able to obtain and interpret information provided by the oscilloscope. They will also be able to perform basic amplitude and frequency measurements with an oscilloscope.

L. Understand how a Wheatstone bridge circuit operates and how it relates to the use of a resistance decade box to check a resistance temperature detector (RTD) temperature monitoring system. They will also know how to use a signal generator, an AC/DC power supply, a vacuum tube tester, and a millivolt potentiometer in common plant applications.

M. Be able to deductively identify defective circuit boards in electronic systems, troubleshoot them by following a manufacturer's test procedure, and perform the necessary repairs. They will be familiar with typical resistance test and voltage test procedures and the handling precautions required for both heat-sensitive and electrostatically sensitive components. With sufficient practice, they will be able to develop the physical skills necessary for soldering on printed circuits and the troubleshooting skills needed for diagnosing circuit board problems without the use of a manufacturer's test procedure.

N. Understand the basic purpose of closed loop electronic control systems, the principles that govern the operation of these systems as a whole, and the functions of the basic elements in a typical system. In addition, the students will understand how to use schematic diagrams to determine the operation of specific circuits within a system, and they will be able to explain the functions of the controls and scales commonly associated with the equipment used in electronic control systems.

O. At the conclusion of this unit, students will be able to read and interpret various types of electronic diagrams. They will know what type of information each diagram provides, and they will be able to select the appropriate diagram for a specific task or situation.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 6/20/83
Review Date: ______

1. Course Number ELEC 210 Title Electrical Apprenticeship III
   Credit Hours 5 (4+2p) Total lecture/recitation hours 63
   Total lab/shop hours 28 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Instruction in electrical and logic diagrams, lighting circuits, the national electrical code, and troubleshooting AC and DC systems will be provided.

3. Goals:

   The student will apply basic electrical concepts to troubleshooting situations to maintenance problems.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 68%

6. **Objectives**: The student will:

A. Be able to use Ohm's Law to calculate unknown quantities in series and parallel circuits, and they will know how inductors and capacitors work and how they can be used.

B. Have a thorough understanding of magnetism and electromagnetic theory. They will be familiar with the characteristics of magnetic fields, the factors determining electromagnetic field strength, and Lenz's Law, and they will be able to explain the operating principles of electric motors, generators, and transformers.

C. Have an understanding of what alternating current is, how it works, and how it affects the operation and maintenance of AC equipment. In addition, they will understand how inductance, capacitance, and resistance affect AC power. Finally, they will know, in general, the differences between single-phase and three-phase systems. Covered in third year.

D. Have a basic understanding of transformer theory and transformer connection schemes. They will know the relationship between the turn's ration and the voltage ration. They will have a basic understanding of the single phase two wire distribution system and the single phase three wire system.

E. Have a basic understanding of how single phase motors operate, and they will be familiar with the procedures associated with some common types of maintenance work that is performed on single phase motors. Covered in third year.

F. Have a basic understanding of how three phase motors are constructed, how they operate, and how they are tested, maintained, disassembled, inspected, and reassembled.

G. Have a basic understanding of what a DC motor is and how it functions. The students will be able to recognize various types of DC motors used in their plant. They will know how to disassemble, inspect, repair, and reassemble a DC motor. Covered in third year.

H. Have a basic understanding of what motor branch circuits are and what components they can include. They will know how safety switches, fuses, molded-case circuit breakers, and motor controllers operate, and they will have a basic understanding of grounding systems, preventive maintenance. Covered in third year.

I. Have a basic understanding of DC generators and how they function.

J. Have a basic understanding of how a simplified AC generator operates. They will be able to recognize different AC generator parts. Covered in third year.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 6/20/83
Review Date: ____________

1. Course Number ELEC 260 Title Electrical Apprenticeship IV

   Credit Hours 4 (3+2P) Total lecture/recitation hours 45

   Total lab/shop hours 60 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Functions of basic electronics, power supplies, tubes and transistors, amplifiers and oscillator, vacuum tube circuits, electronic test equipment, circuit board terminators, electronic controls and diagrams, and binary clock kit assembly

3. Goals:

   The student will be able to explain the fundamentals of basic electronics and how it relates to basic electrical problems.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a thorough understanding of transformer theory and transformer connection schemes. They will be familiar with the common types of transformers, including dry- and wet-type distribution transformers, power transformers, and instrument transformers. They will be able to describe various transformer test procedures and explain the necessary safety precautions for each type of test. They will know all three phase connections and how to calculate voltage, current and power on all three phase systems.

B. Have a thorough understanding of how single phase motors operate. They will be able to recognize and distinguish between different types of single phase motors, and they will be familiar with the procedures associated with some common types of maintenance work that is performed on single phase motors.

C. Have a thorough understanding of how three phase motors are constructed, how they operate, and how they are tested, maintained, disassembled, inspected, and reassembled.

D. Have a thorough understanding of what a DC motor is and how it functions. The students will be able to recognize various types of DC motors used in their plant. They will be familiar with the appropriate troubleshooting method for each type of motor, and they should know how to disassemble, inspect, repair, and reassemble a DC motor.

E. Have a basic understanding of what motor branch circuits are and what components they can include. They will know how safety switches, fuses, molded-case circuit breakers, and motor controllers operate, and they will have a basic understanding of grounding systems, preventive maintenance, and troubleshooting in connection with motor branch circuits.

F. Covered in second year. They will be able to recognize different AC generator parts and methods of electrical connection, different systems of voltage regulation, and auxiliary systems associated with some large AC generators. Finally, they will be familiar with the procedures associated with some common types of maintenance work performed on AC generators and their systems of excitation.

G. Have a thorough understanding of DC generators and how they function. They will be able to recognize the various kinds of DC generators used in their plant, and they will be familiar with the maintenance actions required to repair them and to ensure their proper operation.

H. Have a basic understanding of four types of electrical diagrams: block diagrams, single line diagrams, schematic diagrams, and wiring diagrams. They will be able to read simple examples of the four types of diagrams, and they will have a basic idea of how to apply their knowledge in troubleshooting situations.

I. Have a basic understanding of how to read connection and interconnection diagrams, raceway diagrams, and logic diagrams. They will also know how to use a "Raceway Schedule," a "Raceway Notes, Symbols, and Detail" book, and truth tables.

J. Have a basic understanding of how the AC motor controllers in their plant operate to perform specific control and protection functions. They will know how magnetic contactors work, and they will understand how various types of overload devices and pilot devices operate. They will also be familiar with the operation of LVR (Low Voltage Release) controllers, LVP (Low Voltage Protection) controllers, LV (Low Voltage) relays, reduced voltage start controllers, two-speed controllers, and reversible controllers.

K. Have a basic understanding of how to locate controller components using a schematic diagram and a wiring diagram; how to apply the basic steps of troubleshooting; and how ot perform preventive maintenance procedures. They will know how to test an energized controller for opens and how to test a de-energized controller for grounds, opens and shorts.

L. Know what DC motor controllers are, how they are classified, and how electromangetic switches operate. They will be familiar with the basic symbols used to represent the various components in DC controllers, and they will be able to read both simple and complex controller diagrams. Finally, the students should be able to explain how the devices within a controller regulate the speed of the motor.

M. Have a basic understanding of the troubleshooting procedures and techniques applicable to DC motor controllers, and they will be able to use controller diagrams and charts properly and efficiently when troubleshooting a controller. The students will be able to perform preventive maintenance inspection, and to do both preventive and corrective maintenance tasks on DC controllers.

N. Know what troubleshooting is and why it is important. They will understand what systems, subsystems, units, and components are as they are defined in the unit, and they will know how to identify and locate grounds, shorts, and opens. They will know how to make simple emergency repairs to AC equipment, and limitations and safety precautions associated with emergency repairs.

O. Know what troubleshooting is and why it is important. They will understand what systems, subsystems, units, and components are as they are defined in the unit, and they will know how to identify and locate grounds, shorts, and opens. They will also know how to make simple emergency repairs to DC equipment, and they will be aware of the limitations and safety precautions associated with emergency repairs.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________

Division Head ______________________

SYLLABUS

Date of Origin: 8/20/83
Review Date:

1. Course Number CHPL, ELEC, FUEL, INME ININ, POPL, SCOP, WAST 270, 272, 274, 276 Title Power Plant Overview I, II, III, IV

Credit Hours 1, 2, 2, 2
Total lecture/recitation hours 105
Total lab/shop hours 0
Semester offered Fall, Spring, Summer

2. Catalog Description:

Interdisciplinary course that requires each apprentice to respond to plant questions dealing with general plant information and material specifics to that individuals trade.

3. Goals:

The student will research various systems, equipment, and technique to compliment the various on-the-job assignments in each year and to pass appropriate yearly test.

4. Student Responsibilities:

The student will be expected to:

A. Research vendor manuals.
B. Know related safety procedures and limits.
C. Research diagrams and prints.
D. Seek additional related information from journeyman and supervisors in both operations and maintenance groups.
E. Have a thorough knowledge of the assigned tasks and to demonstrate this knowledge in the yearly final on plant questions.

5. Evaluation:

A. Supervisor must sign off the apprentices' progress indicating satisfactory performance in learning designated skills.

B. The yearly test covering the field questions will be graded and count as 50% of the yearly grade.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 58%

6. Objectives: The student will:

A. Have an understanding of materials of construction, and the affect of abrasive and corrosive materials found in a power plant environment.

B. Have an understanding of the safety devices, safe application, safety limits, and safety procedures related to their specific system or equipment.

C. have a general understanding of how each system or piece of equipment affects the plant as a whole unit.

D. Be able to identify an emergency situation, evaluate and take proper corrective action.

7. Learning Activities/Methods of Instruction:

Observation of proper methods
Journeymen directives
Shop demonstrations
Vendor presentations
Self-read instructions
Classroom lecture/application

Originator Signature ______________________________

Division Head ____________________________________

INDUSTRIAL WATER TREATMENT PROGRAM

FUEL 110	5
FUEL 180	5
FUEL 210	5
FUEL 260	5
Cooperative Education	16
FUEL 280 - 4 Credits	
FUEL 282 - 4 Credits	
FUEL 284 - 4 Credits	
FUEL 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition I - 3 Credits	
ENGL 218 - Technical Writing - 3 Credits	
Humanities Elective - 3 Credits	
MATH 113 - Applied Mathematics for Vocational Students - 3 Credits	
OR	
any Math course higher than MATH 113	
SPCH 110 - Public Speaking - 3 Credits	
OR	
SPCH 111 - Speech Communications	
Power Plant Overview	7
FUEL 270 - 1 Credit	
FUEL 272 - 2 Credits	
FUEL 274 - 2 Credits	
FUEL 276 - 2 Credits	
Electives	4
Total Credits	62

SYLLABUS

Date of Origin:
Review Date:

1. Course Number FUEL 110 Title Fuel and Water Analyst I
Credit Hours 5 Total lecture/recitation hours 75
Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

Instruction in mathematics, inorganic and organic chemistry, SI Metric physics, and qualitative analysis.

3. Goals:

The student will receive the basic theoretical background in science and mathematics to prepare for the more technical courses in the fuel and water analyst program.

4. Student Responsibilities:

The student will be expected to:

A. Attend every class session.
B. Complete assignments on time.
C. Follow safety procedures and guidelines.
D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 68%

6. Objectives:

1. Review the basic operations of arithmetic, including the addition, subtraction, multiplication, and division of positive whole numbers, decimals, and fractions.
2. Perform addition, subtraction, multiplication, and division with signed numbers.
3. Interpret arithmetic operations with signed numbers using a number line.
4. Calculate positive and negative integers, power of numbers.
5. Determine the square root of numbers directly and by using a table of roots.
6. Multiply and divide numbers expressed as powers of the same base number.
7. Translate any number from decimal to standard scientific notation..
8. Translate any number from scientific notation to decimal form.
9. Relate prefixes such as mega-, kilo-, and milli- to scientific notation.
10. Compare two numbers written in scientific notation to determine which is larger.
11. Multiply and divide numbers written in scientific notation.
12. Add and subtract numbers written in scientific notation.
13. Find the square root of a number written in scientific notation.
14. Convert a physical quantity from the units in which it is expressed to any other units.
15. Determine the number of significant digits in any number.
16. Round any number to a specified number of significant digits.
17. Express the answer to any arithmetic calculation with the proper number of significant digits.
18. Construct a rectangular coordinate system, label its axes, and identify and locate point in terms of their coordinates.
19. Draw a graph from a set of measurements or other experimental data.
20. Recognize linear and non-linear increasing or decreasing graphic functions.
21. Draw the graph representing a simple algebraic equation.
22. Interpret the meaning of the slope of a graph.
23. Determine the slope of a straight line.

24. Approximate the slope of a simple non-linear curve at a certain point on its graph.

25. Define the terms, ratio, proportion, and relation.

26. Define direct and inverse proportion and illustrate these terms both graphically and algebraically.

27. Translate simple English sentences into algebraic expressions.

28. Perform common operations with algebraic expressions.

29. Calculate the numberical value of literal expressions or formulas.

30. Recognize and solve linear equations in one unknown.

31. Recognize and solve quadratic equations.

32. Solve pairs of simultaneous linear equations.

33. Use conventional notation in describing triangles.

34. Use the Pythagorean Theorem to calculate the length of one side of a right triangle when the other sides are given.

35. Draw right, isosceles, 3-4-5, 30-60-90, and 45-45-90 triangles and label their sides and angles correctly.

36. Calculate the sine, cosine, and tangent of an angle in a right triangle whose sides are given.

37. Find the sine, cosine, and tangent of any angle from 0° to 90° in a table of trigonometric functions.

38. Determine the length of two sides of a right triangle when one side and one acute angle are given.

39. Determine the angles of a right triangle when two sides are given.

40. Define a vector.

41. Represent a vector by an arrow or directed line segment.

42. Multiply a vector by a scalar.

43. Find the sub or difference of two plane vectors using the parallelograph rule.

44. Find the components of a vector.

45. Find the sum or difference of two plane vectors from their components.

46. Calculate the magnitude and direction of a vector from its components.

47. Determine the probabilities associated with simple events.

48. Given the separate probabilities of the independent events A and B, calculate the probabilities of the combined events (A or B) and (A and B).

49. Calculate the mean, mode, median, range, average deviation, and standard deviation for a set of measurement numbers.

50. Recognize the graph of a normal distribution of measurements and correctly interpret it in terms of the mean and standard deviation of the measurement numbers.

51. Describe the various states, forms, and prospectus of matter.

52. Define atoms, molecules, compounds, and elements.

53. Discuss the development of the atomic theory.

54. Use the fundamental units of measurement and temperature scales in the metric system.

55. Identify the prospectus of gases, liquids and solids.

56. Explain the process of transforming gases to liquids and liquids to solids.

57. Describe the basic of the laws of mass and energy using the appropriate symbols and formulas.

58. Define and calculate atomic and modecular weights.

59. Write and balance simple equations.

60. Define scientific thinking.

61. Explain valence and electrovalence and its use in formula writing.

62. Classify certain acids, bases, and salts.

63. Describe the solubility rubs.

64. Correlate electrolytic reactions and conductivity with ionization of acids, bases, and salts in solution.

65. Explain quantum numbers.

66. Explain in writing the periodic law, chemical bonding, complex compounds, basic chemical calculations, specific gravity and degree baume and chemical equilibrium.

67. Describe in a basic form colloids, ideal-gas law, oxidation-reduction reactions, electrochemistry, hydrogen-ion concentration and pH, radioactive elements, nuclear reactions, radioisotopes, and fusion.

68. Describe how organic compounds differ from inorganic compounds.

69. Know and perform the various tests for identifying organic materials.

70. Analyze organic compounds to determine how much of an element is present in unknown substance.

71. Determine molecular structure of organic compounds.

72. Demonstrate how saturated and unsaturated compounds differ from each other in their structural formulas and general prospectus.

73. Identify SI base units and derived units.

74. Identify the meaning of SI symbols and prefixes.

75. Use the proper conversion tables in the text to convert U.S. Customary measurements of length, temperature, energy, power, area, light, speed, pressure, and mass to equivalent SI measurements, rounding off as required.

76. Describe fundamental physic principles including motion, properties or fluids, laws of gases, work energy, and power, machine elements, heat, sound, light electricity, magnetism and electronics.

77. Understand the basics of inorganic chemicals and processes dealing with oxygen, ozone, hydrogen, hydrogen peroxide and water.

78. Define solutions, law of mass action and solubility.

79. Describe the more common analytical procedures and the preparation reogents.

80. Identify the metals calcium through zinc and explain the action of reogents on metals.

81. Identify the difference between oxidation and reduction as they apply to the transfer of electrons and the periodic table.

82. Explain the behavior of acids and their radicals with reogents.

83. Demonstrate the appropriate procedures for a qualitative analysis of water.

84. Discuss and apply information relative to chemical theory, standard solutions, and analytical measurements.

85. Perform laboratory techniques for gravemetric determinations.

86. Perform the determination of moisture, chlorine, iron, aluminum, sulphur, calcium, magnesium, solicon, phosphorous, potassium, chromium, copper, molybdenum, and zinc.

87. Analyze limestone gravimetrically for loss on ignition, and for silica, combined oxides, calcium, magnesium, carbon dioxide and sulfur.

88. Explain the basic principles and procedures of volumetric analysis and solutions.

89. Analyze acids and alkalies.

90. Perform the proper analysis of coal, gas, soap, water, soils, fertilizers and atmosphere.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ___________________________________

SYLLABUS

Date of Origin: July 26, 1983
Review Date:

1. Course Number FUEL 180 Title Fuel and Water Analyst II
   Credit Hours 5 Total lecture/recitation hours 75
   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Instruction in equipment operations and maintenance, safety, schematics, piping systems, hydraulics, pneumatics and chlorination.

3. Goals:

   The student will receive a basic understanding of mechanical, instrumentation and safety principles relative to preparing for a position as a fuel and water analyst.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. Fifty percent of the grade will be equivalent to an average of each unit exam; and the remaining 50 percent of the final grade will be a comprehensive final exam.

   D. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 68%

6. Objectives:

1. Explain and be able to perform the working of a steam-electric generating station and be able to operate and maintain the peripheral equipment. Below is a list of the concepts to be emphasized.

    1. Pressure and Flow
    2. Temperature and Heat
    3. Properties of Water
    4. Combustion Process
    5. Fuel Preparation and Handling
    6. Handling Combustion Air and Gas
    7. Combustion Heat Flow
    8. Ash removal
    9. Furnance explosions
    10. Steam-water cycle
    11. Turbine
    12. Condenser
    13. Condensate and Boiler Feed System
    14. Water Treatment
    15. Water and air
    16. Oils and Lubrication
    17. Valves, Traps and Piping
    18. Pumps and Compressors
    19. Station Service Systems
    20. Instrumentation
    21. Main Control Systems
    22. Interlocks
    23. Operating the Steam Power Plant
    24. Station Performance
    25. The Job of the Operator

2. Pass a written exam dealing with safety procedures. The material will be taken from the Accident Prevention Manual.

3. State the definition of a schematic.

4. Name thethree general areas in which schematics are used.

5. Describe how maintenance specialists use schematics.

6. Identify a schematic among other kinds of technical drawings and diagrams.

7. Explain the difference between direct current and alternating current.

8. List ways in which all schematics are similar.

9. Identify the following schematics by their symbols.
Electrical
Fluid-power
Piping

10. Explain why symbols are superior to pictures and double-line drawings in diagrams.

11. Demonstrate a step-by-step approach to troubleshooting by using a schematic.

12. State the meaning of symbols and lines on an electrical schematic.

13. Explain the difference between feeder wires and service lines.

14. Identify the symbols for coils, inductors, and transformers.

15. Explain the difference in operation between a fuse and a circuit breaker.

16. Name the starting point for tracing a circuit.

17. Explain the difference between a pictorial drawing, a wiring diagram, and a schematic diagram.

18. Explain the difference in current flow between a series circuit and a parallel circuit.

19. Demonstrate how to read a wiring diagram.

20. Demonstrate how to read an electrical schematic.

21. Identify the objects represented by the symbols on an industrial schematic.

22. Explain the function of a piping system in a plant.

23. Name the ways of joining pipe.

24. Identify the symbols for various kinds of fittings, and describe the function of each fitting.

25. State the five purposes of fittings.

26. Explain the difference between a gate valve and a globe valve.

27. Identify the symbols for a gate valve and a globe valve.

28. Identify the symbol for a check valve.

29. Demonstrate the ability to determine pipe size from a diagram.

30. Describe a fluid-power system.

31. List the five main parts of a hydraulic system, in order.

32. List the five main parts of a pneumatic system, in order.

33. Comprehend the theory application, use, and safety factors pertaining to chlorine; to help prepare the operator for examination for artification; to advance the students skill and knowledge in never, more modern, and practical methods of chlorination.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Simulation
Projects
Field Trips

Originator Signature ______________________

Division Head ______________________

SYLLABUS

Date of Origin: August 19, 1983
Review Date:

1. Course Number FUEL 210 Title Fuel and Water Analyst III
   Credit Hours 5 Total lecture/recitation hours 75
   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Instruction in industrial water conditioning and water treatment.

3. Goals:

   Student will receive information to prepare for journeyman status as a fuel and water analyst.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. Fifty percent of the grade will be equivalent to an average of each unit exam; and the remaining 50 percent of the final grade will be comprehensive final exam.

   D. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives:

Student will:

1. Explain the evaluation of industrial water treatment.
2. Identify common water sources and impurities.
3. Identify aeration and identify its basic uses.
4. Discuss the importance of chlorine gas and its significance for industrial water conditions.
5. Define coagulation, Floculation and sedimentation and explore the steps of clarification.
6. Explain the mechanical process of filtration.
7. Describe the precipitation and softening process.
8. List the general problems caused by impurities in water.
9. Identify the methods of removing ionic impurities, nonionic impurities, and gaseious impurities.
10. Explain ion exchange.
11. Describe the process in achieving system generation to achieve increased efficiency and the appropriate practices that are most useful.
12. Discuss corrosion inhibition in system generating systems, deposits in system generating systems, carryover of boiler water high pressure boiler systems.
13. Identify the following methods for a productive internal waste water treatment program that include:

    - Control and minimizing of corrosion
    - Prevention of deposition of insoluble salts
    - Fluidization dispersion, or the rending harmless of suspended matter.

14. Explain the functions of cooling water systems:

    - Cooling Water systems - Heat transfer
    - Corrosion Control - Cooling Systems
    - Deposit and Scale Control - Cooling System
    - Microbiological Control - Cooling Systems
    - Cooling Tower Wood Maintenance
    - Once-through Cooling Systems
    - Open Recirculating Cooling Systems
    - Closed recirculating cooling systems
    - Pretreatment of Cooling Water Systems
    - Treatment of Cooling Tower Blowdown

15. Understand the purpose of the demineralizer.
16. Be familiar with the analytical procedures manual.
17. Define spectroscopy and chromotography.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: August 19, 1983
Review Date:

1. Course Number FUEL 260 Title Fuel and Water Analyst IV
   Credit Hours 5 Total lecture/recitation hours 75
   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Instruction in cooling towers and systems, corrosion, chemical calculations, emission controls, basic instrumentation and electrical theory.

3. Goals:

   This course will prepare the apprentices for journeyman status in this particular trade.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. Fifty percent of the grade will be equivalent to an average of each unit exam; and the remaining 50 percent of the final grade will be a comprehensive final exam.

   D. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives:

1. Understand and cope with the fuel handling and storage problems related to a boiler.
2. Solve basic problems using dimensional analysis.
3. Know the workings of the metric system.
4. Work with three conversion factors - density, specific gravity and percentage.
5. Calculate the molu=ecular weight for specified compounds, mole and weight related property, and weight and number of molecules and atoms.
6. Calculate the percentage composition by dimensional analysis and of a complexed molecule in a compound.
7. Balance chemical equation, stoichiometry; weight stoichiometry and reaction controlling components.
8. Know the three conversion factors for molarity, formolity , and molaility
9. Know how to use the conversion factor for normality.
10. Describe the general characteristics of instruments including temperature pressure, level measurement, flow meters, transmission and control.
11. Understand basic electricity including volts, ampheres, ohms, watts, meters, controls, and transformers.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 8/20/83
Review Date:

1. Course Number CHPL, ELEC, FUEL, INME ININ, POPL, SCOP, WAST 270, 272, 274, 276 Title Power Plant Overview I, II, III, IV

   Credit Hours 1, 2, 2, 2 Total lecture/recitation hours 105

   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Interdisciplinary course that requires each apprentice to respond to plant questions dealing with general plant information and material specifics to that individuals trade.

3. Goals:

   The student will research various systems, equipment, and technique to compliment the various on-the-job assignments in each year and to pass appropriate yearly test.

4. Student Responsibilities:

   The student will be expected to:

   A. Research vendor manuals.
   B. Know related safety procedures and limits.
   C. Research diagrams and prints.
   D. Seek additional related information from journeyman and supervisors in both operations and maintenance groups.
   E. Have a thorough knowledge of the assigned tasks and to demonstrate this knowledge in the yearly final on plant questions.

5. Evaluation:

   A. Supervisor must sign off the apprentices' progress indicating satisfactory performance in learning designated skills.

   B. The yearly test covering the field questions will be graded and count as 50% of the yearly grade.

   C. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 58%

6. Objectives: The student will:

A. Have an understanding of materials of construction, and the affect of abrasive and corrosive materials found in a power plant environment.

B. Have an understanding of the safety devices, safe application, safety limits, and safety procedures related to their specific system or equipment.

C. have a general understanding of how each system or piece of equipment affects the plant as a whole unit.

D. Be able to identify an emergency situation, evaluate and take proper corrective action.

7. Learning Activities/Methods of Instruction:

Observation of proper methods
Journeymen directives
Shop demonstrations
Vendor presentations
Self-read instructions
Classroom lecture/application

Originator Signature ______________________________

Division Head ____________________________________

INDUSTRIAL MECHANICS

INME 110 - Industrial Mechanics I	5 (4+2p)
INME 180 - Industrial Mechanics II	4 (3+2p)
INME 210 - Industrial Mechanics III	4 (3+2p)
INME 260 - Industrial Mechanics IV	5 (5+1p)
WELD 120 - Employer Based Appr.Welding I	3 (2+2p)
WELD 123 - Employer Based Appr.Welding II	2 (1+2p)
Cooperative Education	16
INME 280 - 4 Credits INME 282 - 4 Credits INME 284 - 4 Credits INME 286 - 4 Credits	
General Education	15
ENCL 111 - Freshman Composition - 3 Credits ENCL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics - 3 Credits for Vocational Students OR any Math course higher than MATH 113	
SPCH 110 - Public Speaking - 3 Credits OR SPCH 111 - Speech Communications	
Elective - 3 Credits	
Power Plant Overview	7
INME 270 - Power Plant Overview I	1 Credit
INME 272 - Power Plant Overview II	2 Credits
INME 274 - Power Plant Overview III	2 Credits
INME 276 - Power Plant Overview IV	2 Credits
Total Credits	64

SYLLABUS

Date of Origin: 6/21/83
Review Date: ____________

1. Course Number INME 110 Title Industrial Mechanics I

   Credit Hours 5 (4+2p) Total lecture/recitation hours 63

   Total lab/shop hours 30 Semester offered Fall, Spring, Summer

2. Catalog Description:

   This is the initial course in the program. It deals with safety; hand, power and measurement tools; basic lubrication and basic bearings; blueprint reading; and pipefittings.

3. Goals:

   The student will be exposed to the basic fundamentals of mechanics to commence the preparation for journeyman status.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 68%

6. Objectives:

A. Have a basic understanding of safety practices at the plant. They will know why safety is their concern, what hazards to be alert for, and what precautions and safety equipment are required for each type of hazard.

B. Have the knowledge they need to wear the correct respirator, in the proper manner, for any situation requiring respiratory protection that might be encountered at work. They will be able to put on the respirator, wear it in a working situation, and recognize its limitations. The trainees will be able to detect signs of wear and possible leakage.

C. Be aware of the hazards involved with each of the potentially dangerous substances used in the plant. They will know the procedures and protective equipment used to help prevent accidents when hazardous substances are handled.

D. Be aware of fire hazards both at home and on the job. They will be familiar with plant procedures for fire prevention and for reporting fires, and they will be able to select the appropriate fire extinguisher and use it to put out small fires.

E. Be able to identify the more common striking and fastening tools and explain the purpose and function of each one. They will be able to determine the type and size of tool to be used in a given situation and know what to look for when inspecting the tool. The concepts of properly matching a tool to a task and using each tool safely will be emphasized throughout the unit, and the students will demonstrate their knowledge of proper tool care and storage techniques.

F. Have a basic understanding of the purposes of pliers, vises, clamps, and punches; how different types of each are selected for particular jobs; and how each tool is used safely and efficiently. In addition, the students will know when certain tools are not appropriate for given jobs. They will also understand the principles and importance of proper care and storage of pliers, vises, clamps, and punches.

G. Have a basic understanding of the various types of electric and pneumatic power grinders, power saws, impact wrenches, pipe threading machines, portable drills, and drill presses are selected for particular jobs; and how each tool is used safely and efficiently. In addition, the students will know when each of the tools covered in the unit is not appropriate for a given job.

H. Have a basic understanding of the purpose of chisels, snips and shears, hacksaws, files, taps and dies; how different types of each are selected for particular jobs; and how each is used safely and efficiently. In addition, students will know when the above listed tools are not appropriate for a given job. They will also understand the principles and importance of proper care and storage of all cutting tools.

I. Have a basic understanding of the purpose of units of measurement, the difference between the English system and the metric system, and the parts, uses, and care of basic coarse measurement tools. Measurement tools covered in this unit include rules (rigging, folding, and tape), simple calipers (including slide calipers), and torque wrenches.

J. Have a basic understanding of the procedures for selecting, measuring, caring for, and storing common precision measurement tools. The precision measurement tools covered in this unit include: vernier calipers, micrometers (outside, inside, and depth gauge), dial indicators, thickness gauges, wedge (taper) gauges, thread gauges, wire and sheet metal gauges, and go/no-go gauges.

K. Have an understanding of what lubrication is, why and how lubricants are used, and the reasons for choosing a particular lubricant. The students will also be able to handle and store lubricants properly.

L. Have an understanding of friction; sliding surface and rolling contact bearings and the characteristics of each; and how to replace a rolling contact bearing.

M. Have a basic understanding of what prints are and how they are used. They will be able to identify the major components of piping systems and fluid power systems, and they will be able to show how these components are represented symbolically on system prints. They will also be able to identify and draw symbols for the various types of fasteners and welded joints that may appear in machine prints. Finally, the students will to list the four steps in effective print reading, and they should be able to use these steps to obtain information from a variety of prints.

N. Have a basic understanding of the maintenance procedures for ensuring that a piping system is properly installed with the appropriate fittings. In addition, the students will be able to detect signs of wear or damage during a routine inspection tour and perform the maintenance necessary for correcting or replacing a defective line of pipe or a fitting.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 6/21/83
Review Date:

1. Course Number INME 180 | Title Industrial Mechanics II
   Credit Hours 4 (3+2p) | Total lecture/recitation hours 46
   Total lab/shop hours 30 | Semester offered Fall, Spring, Summer

2. Catalog Description:

   Instruction in maintenance practice, red tagging procedures, work permits, metallurgy, non-destructive testing, resurfacing techniques, bearings, riggings, piping auxiliaries, Steam traps, valve maintenance, and thermal insulation.

3. Goals:

   The student will become familiar with a basic understanding of metallurgy and troubleshooting of certain apparatuses at the plant.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a basic understanding of the differences between the types of boilers, and they indicate the potential problems associated with each boiler component.

B. Have a basic understanding of what refractory does in the boiler, why it fails, and when and where certain types of refractory are used. The students will have a working knowledge of how to repair furnace walls using refractory brick, plastic refractory, and castable refractory.

C. Have a working knowledge of the fireside boiler inspection process.

D. Have a basic understanding of how soot blowers operate and how they are maintained. They will know the types of problems that are likely to occur during soot blower opeation, and they will be able to correct these problems by performing the proper in-service or shop maintenance.

E. Know the purposes of and procedures for waterside inspection and the steps involved in a chemical cleaning of the boiler. They will also know what problems to look for in the waterside components and how each problem can be detected and dealt with. Finally, the students will be familiar with fireside cleaning, the last steps leading to full boiler pressurization, and the procedures for hydrostatic and air tests.

F. Have a basic understanding of why boiler tubes fail, what some of the more common types of tube failures are, and how these failures are repaired. After successfully completing the unit, the students will be able to assist a welder during repair operations in the plant.

G. Have a basic understanding of what heat exchangers are and how they are used in the plant. They will be able to identify the parts of each type of heat exchanger used in their plant and explain the function of each part. In addition, they will be able to survey and troubleshoot heat exchangers and assist in performing inspection, cleaning and maintenance.

H. Have an understanding of the types of heat exchanger maintenance problems frequently encountered. In addition, they will be able to perform the heat exchanger maintenance routines practiced in their own plant.

I. Have an understanding of what gauge glasses are, how they work, why they are important to plant operation, and how to overahaul the three common types. The students will have a working knowledge of how to assist in gauge glass maintenance or how to perform the maintenance alone (assuming all suggested exercises are followed).

J. Have a basic understanding of what pressure relief devices are and how they are used. They will be able to identify the various types of rupture discs, relief valves, and safety valves used in their plant, and they will know how each device operates.

K. Have a basic understanding of the procedures and techniques used to maintain safety valves in their plant. They will know how to find the causes of valve problems; how to disassemble a valve, inspect the components, perform necessary maintenance, and reassemble the valve; and how to test and gag valves to make sure that the valves and their systems are operating properly.

L. Be familiar with the operating principles of both positive displacement compressors and dynamic compressors. They will be able to identify seven different kinds of compressors and explain the functions of their basic controls and accessories.

M. Have a basic understanding of the maintenance requirements for a typical reciprocating air compressor. They will know how to disassemble the compressor, inspect its parts for wear or damage, perform applicable maintenance work, and then put the compressor back together.

N. Have a basic understanding of the purpose of pumps, two of the most common types of pumps, the parts, types, and functions of positive displacement pump problems. In addition, the students will be able to explain the purpose and two major types of pump sealing systems, the parts and functions of mechanical seals, and precautions that must be followed in handling delicate mechanical seal parts.

O. Have a basic understanding of the procedures for disassembling, cleaning, inspecting, and reassembling a rotary-screw positive displacement pump. In addition, the students, with guidance, will be able to identify the symptoms and the causes of common mechanical seal problems, as well as the procedure for replacing faulty mechanical seals.

P. Have a basic understanding of the purpose of the two major types of pumps and the types, parts and functions of centrifugal pumps. In addition, the students will, with guidance, be able to identify the symptoms and the causes of common pump problems.

Q. Have a basic understanding of the procedures for cleaning, disassembling, inspecting, and reassembling a basic centrifugal pump. In addition, the students will, with guidance, be able to identify the symptoms and the causes of common pump packing problems, and know the procedure for correcting such problems.

R. Have a basic understanding of how gaskets, packing, and mechanical seals control leakage in fluid systems. They will know how to cut contoured gaskets and flat ring gaskets and how to prepare a surface for gasket installation. They will be familiar with some of the common types of packing materials and with the various packing shapes, and they will know how to repack a pump and a valve. Finally, they will know how mechanical seals work and how they are classified, and they will be able to remove a mechanical seal, lap the stationary face, and install a mechanical seal assembly in a pump.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 6/24/83
Review Date: __________

1. Course Number INME 210 Title Industrial Mechanics III
   Credit Hours 4(3+2P) Total lecture/recitation hours 45
   Total lab/shop hours 30 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Instruction in couplings and shaft alignment; boiler refrosting and soot blower maintenance; boiler inspection, cleaning and tube repairs; heat exchangers and gauge glass maintenance; safety valves; air compressors; and PD and centrifugal pumps.

3. Goals:

   The student will have the ability to maintain and troubleshoot (in-depth) pumps and boilers.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a basic understanding of the principles of metallurgy and how metallurgy is related to practices in the shop. They will be familiar with the properties of metals, and they will be able to identify metals by their properties and characteristics. In addition, the students will be able to demonstrate a working knowledge of metals and the common causes of metal failures.

B. Have a basic understanding of the fundamentals of non-destructive testing. They will be able to use a digital thickness gauge and correctly perform and interpret a liquid penetrant.

C. Have a basic understanding of the different ways that abrasives can be used to wear away a surface and thus expose a new surface. They will be able to compare various types of abrasives and use the correct types for typical grinding, lapping, and honing applications. They will be able to select the right grinding wheel for a particular job, true the wheel, dress it, mount it, and use it. They will know how to use various types of pedestal grinders, portable grinders and surface grinders, and they will be able to lap both a flat surface and a curved surface. In addition, they will be able to use a honing tool to resurface the inside of a cylinder.

D. Have a basic understanding of what rolling contact bearings are and how they function. The students will be able to recognize various types of rolling contact bearings and bearing housings used in their plant and they will be familiar with the appropriate installation and lubrication methods for each type.

E. Have a basic understanding of the various types of rolling contact bearing failures; how to examine a bearing to detect the cause of failure; how to remove a failed bearing; and how to install a new bearing.

F. Have a basic understanding of the various types of sliding surface bearings and how they operate; the different materials they are made of; the ways that they are lubricated; the signs that indicate how they are performing; and some of the most common causes of bearing failure.

G. Have a basic understanding of the procedures for disassembling, inspecting, reassembling, and testing sliding surface bearings. They will also know how to check clearance and contact on a ring-oiled journal bearing and how to remove and replace thrust shoes on a tilting pad thrust bearing.

H. Have an understanding of basic rigging practices and rigging safety. They will list the steps involved in planning a rigging job, and they will be familiar with the use of common types of rigging equipment. In addition, they will develop a basic vocabulary of rigging terms for use both on the job and in more advanced training.

I. Have a practical knowledge of basic rigging procedures and rigging safety. They will be able to plan a rigging job, inspect the necessary equipment, mount the rigging on the load, and move the load to its new location.

J. Have an understanding of advanced rigging practices and rigging safety. They will know how equipment is inspected, how to move loads with jacks and rollers, and how chain hoists can be used to maneuver loads. In addition, they will be familiar with the factors influencing sling ratings and sling tension, know how to use a rigging table, and be able to calculate sling tension.

K. Be familiar with the various types of cranes and scaffolds and their use. They will know how to inspect an overhead crane at the start of a shift, know the function of each of the operating controls of an overhead crane, and understand the stability considerations that affect boom crane operations. In addition, they will erect a portable scaffold and safely use a powered scaffold.

L. Have a basic understanding of what piping auxiliaries are and how they are used. They will identify the various types of filters, strainers, pipe hangers, pipe supports, snubbers, and similar components used in their plant; they will know how each component operates, and they will know how each component is maintained.

M. Have a basic understanding of what steam traps are and how they are used in the plant. They will identify the parts of each type of steam trap used in their plant and explain the function of each part. In addition, they will survey and troubleshoot steam traps and steam trap systems using visual, sound, and temperature methods.

N. Have a basic understanding of the purpose and classification of valves and the design and function of various types of valves. In addition, the students will identify each of the basic types of valves and their components, and demonstrate the functions of the working components of the valves studied in this unit.

O. Have a basic understanding of the maintenance procedures for the operational components of valves, and they will disassemble, remove and replace packing, and reassemble a standard valve. In addition, the students will identify valve malfunctions that commonly occur, and demonstrate the procedures for maintenance and repair of typical wear and damage to the working parts of a valve.

P. Have a basic understanding of the functions and applications of thermal insulation. They will install and repair calcium silicate, fiberglass, cellular rubber, and plastic foam pipe insulation.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 9/20/83
Review Date: __________

1. Course Number INME 260 Title Industrial Mechanics IV
Credit Hours 5(5+1P) Total lecture/recitation hours 75
Total lab/shop hours 18 Semester offered Fall, Spring, Summer

2. Catalog Description:

Instruction in the repair, maintenance, and overhauling of turbines, pulverizers, PD-PA Fans, and preheaters.

3. Goals:

The student will be able to repair and overhaul turbines, pulverizes, fans and preheaters.

4. Student Responsibilities:

The student will be expected to:

A. Attend every class session.
B. Complete assignments on time.
C. Follow safety procedures and guidelines.
D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 68%

6. Objectives: The student will:

1. be able to troubleshoot problems dealing with the primary function of the turbine.
2. be able to repair any major valves controlling the turbine.
3. be able to identify all parts of the turbine.
4. be able to repair all bearings, which include Radial and Thrust Bearings associated with the turbine.
5. be able to assist in balancing of the turbine.
6. be able to assist in the overhaul of the turbine, which includes H.P., I.P. and L.P. Sections.
7. be able to explain the Steam flow and design of the rotor for maximum efficiency of the turbine.
8. be able to explain the function of the front standard.
9. be able to identify the parts of the front standard.
10. be able to explain the oil flow and systems dealing with the turbine.
11. be able to troubleshoot the pulverizers.
12. be able to identify the different types of pulverizers.
13. be able to explain the oil flow and system.
14. be able to tear down and repair the pulverizer.
15. be able to repair the main gear box associated with the pulvizer.
16. be able to explain the function of the pulverizer.
17. be able to take clearance readings associated with the internal parts of the pulverizer.
18. know how to take tension and why we take tension on the pulverizer.
19. know how to do and what preventative maintenance that needs to be done on the pulverizer.
20. be able to explain how a classifier works and operates.
21. be able to identify the difference between a PA and FD fan.
22. know the function of the PA and FD fan.
23. know how to troubleshoot said fans.
24. know the different types of lub oil systems for each type of fan.
25. know how to repair the dampers associated with each fan.
26. know how to set all internal clearances within the fan.
27. know how to repair each type of fan.
28. be able to explain the differences of each fan.
29. know how to level said fan.
30. be able to assist in the balancing of each type fan.
31. be able to identify all parts associated with the preheaters.
32. be able to identify eacy type of preheater
33. be able to explain the function of each preheater.
34. be able to balance a preheater.
35. be able to assertain the types of bearings and lubrication systems each has.
36. be able to repair each type of preheater.
37. be able to explain the purpose of the air motor on each type of preheater.
38. be able to overhaul the sootblower on each type of preheater.
39. be able to take clerances associated with each type of preheater.
40. be able to adjust and maintain all seals in the preheater.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 8/20/83
Review Date:

1. Course Number CHPL, ELEC, FUEL, INME
ININ,POPL,SCOP,WAST
270, 272, 274, 276
Title Power Plant Overview I, II, III, IV

Credit Hours 1,2,2,2
Total lecture/recitation hours 105

Total lab/shop hours 0
Semester offered Fall, Spring, Summer

2. Catalog Description:

Interdisciplinary course that requires each apprentice to respond to plant questions dealing with general plant information and material specific to that individual's trade.

3. Goals:

The student will research various systems, equipment, and technique to compliment the various on-the-job assignments in each year and to pass appropriate yearly test.

4. Student Responsibilities:

The student will be expected to:

A. Research vendor manuals.
B. Know related safety procedures and limits.
C. Research diagrams and prints.
D. Seek additional related information from journeymen and supervisors in both operations and maintenance groups.
E. Have a thorough knowledge of the assigned tasks and to demonstrate this knowlege in the yearly final on plant questions.

5. Evaluation:

A. Supervisor must sign off the apprentices' progress indicating satisfactory performance in learning designated skills.

B. The yearly test covering the field questions will be graded and count as 50% of the yearly grade.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 68%

6. Objectives: The student will:

   A. Have an understanding of materials of construction, and the effect of abrasive and corrosive materials found in a power plant environment.

   B. Have an understanding of the safety devices, safe application, safety limits, and safety procedures related to their specific system or equipment.

   C. Have a general understanding of how each system or piece of equipment affects the plant as a whole unit.

   D. Be able to identify an emergency situation, evaluate and take proper corrective action.

7. Learning Activities/Methods of Instruction:

Observation of proper methods
Journeyman directives
Shop demonstrations
Vendor presentations
Self-read instructions
Classroom lecture/application

Originator Signature____________________

Division Head__________________________

POWER PLANT OPERATIONS

POPL 110	6
POPL 180	6
POPL 210	6
POPL 260	3
Cooperative Education	16
POPL 280 - 4 Credits POPL 282 - 4 Credits POPL 284 - 4 Credits POPL 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition I - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students OR any Math course higher than MATH 113 - 3 Credits SPCH 110 - Public Speaking OR SPCH 111 - Speech Communications - 3 Credits	
Power Plant Overview	7
POPL 270 - 1 Credit POPL 272 - 2 Credits POPL 274 - 2 Credits POPL 276 - 2 Credits	
Electives	3
Total Credits	62

SYLLABUS

Date of Origin: 6/20/83
Review Date:

1. Course Number POPL 110 — Title Power Plant Operations I
   Credit Hours 6 — Total lecture/recitation hours 90
   Total lab/shop hours 0 — Semester offered Fall, Summer, Spring

2. Catalog Description:

   Basic power plant operations, mathematics, plant science, plant auxiliaries and systems, basic electricity, instrumentation, and water chemistry.

3. Goals:

   The student will be exposed to a broad general background of power plant operations and the concepts to specialize in the succeeding courses.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 68%

6. Objectives:

The student will be able to define and/or perform specific tasks related to the following concepts:

a. Power Plant Functions and Operations
b. Steam Turbine and Boiler Fundamentals
c. Applied Mathematics
d. Energy Conversion
e. Pressures, Perspectives and Fluid Flow
f. Steam and its Relationship to Plant Performance
g. Valves, Pipework, traps and strainers
h. Fluid Flow and Pumps
i. Compressors and Fans
j. Heat Exchanges and Variable Speed Drive
k. Reading System Diagrams
l. Steam, Circulating Water, and Condensate and Feedwater Systems
m. Basic Electricity (DC and AC, Motors and Generators, and Transformers and Control)
n. Instrumentation (Flow, Pressure, Temperature, and Level Measurement)
o. Elementary Water Treatment
p. Chemical Reactions
q. Physical-Chemical Properties

At a minimum of 75% accuracy and/or at industrial standards

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Field Trips

Originator Signature ______________________________

Division Head ______________________________

SYLLABUS

Date of Origin: 6/20/83
Review Date: __________

1. Course Number POPL 180 Title Power Plant Operations II
   Credit Hours 6 Total lecture/recitation hours 90
   Total lab/shop hours 0 Semester offered TBA

2. Catalog Description:

   The course includes information on fuels and combustion, boilers, water treatment equipment, turbines, environmental protection, instrumentation and control, power generation, electrical systems and equipment, plant protection, and gas turbines and diesels.

3. Goals:

   The course is a continuation of POPL 110 where the student will become familiar with other types of equipment and their operations.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives:

The student will be able to define and/or perform specific tasks related to the following concepts:

a. Fuel Characteristics
b. Combustion Calculations
c. Fuel Handling and Preparation
d. Steam and Water Circuit
e. Protective Devices
f. Boilers and Water Control
g. Raw Water Treatment
h. Ion Exchanges
i. Cooling Water Treatment
j. Turbine Control, Operation, Protection, and Instrumentation
k. Environmental Protection
l. Transmitters and Computing Relays
m. Tuning the Control Loop
n. Controllers and Activators
o. Generator Cooling
p. Power Facts
q. Three-Phase Connections
r. Reading Electrical Concepts
s. Switchyard Equipment
t. Station Service Supply
u. Power Generation Diesel

At a minimum of 75% accuracy and/or at industrial standards

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ______________________________

SYLLABUS

Date of Origin: 6/20/83
Review Date: ____________

1. Course Number POPL 210 Title Power Plant Operations III

   Credit Hours 6 Total lecture/recitation hours 90

   Total lab/shop hours 5* Semester offered TBA
   *(Minimum 5 hours simulator operation)

2. Catalog Description:

   The course is designed to prepare someone for skills as a auxiliary operator. Various systems are studied along with the basic concepts of ash removal, turbines, and generators.

3. Goals:

   The student will gain an in depth knowledge of the construction; operating parameters, controls, permissives, interlocks and vendor data associated with all systems and major equipment. The student is preparing for responsibility of operating the Main Control Board with hands on practice with a control board simulator and some training on the main control board.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives:

The student will be able to define and/or perform specific tasks related to the following concepts:

a. Steam System
   (1) Boiler Design Control
   (2) Main Steam
   (3) Steam Turbines

b. Condensate Systems/Feed Water Systems
   (1) Condensate System Components
   (2) Condensate System Operations
   (3) Boiler Fuel Pumps and Fuel Water Systems

c. Coal System
   (1) Feeders Pulverizers Burners Fuel Oil
   (2) Control Logic Combustion Control

d. Circulating Water System (Description and Operation)

e. Gas Turbines and Diesel Generators
   (1) Principles of Gas Turbines
   (2) Components of Gas Turbines
   (3) Operations of Gas
   (4) Power Generator Diesel

f. Omnidata Simulator Training

At a minimum of 75% accuracy and/or at industrial standards.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 6/20/83
Review Date: ____________

1. Course Number POPL 260 Title Power Plant Operations IV
   Credit Hours 3 Total lecture/recitation hours 45
   Total lab/shop hours 20* Semester offered TBA
   (*Simulator training = Minimum 20 hours)

2. Catalog Description:

   Operation of electrical systems, boiler controls and information systems, start up sequence, hot and cold shutdown, and plant malfunctions.

3. Goals:

   The student will gain thorough knowledge of plant operations, complete simulator training dealing with plant malfunctions and emergencies, and train on the main control board with a journeyman operator.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives:

The student will be able to define and/or perform specific tasks related to the following concepts:

a. Electrical Systems
   1. Main transformers
   2. Generator Breakers
   3. 6900 Volt Systems
   4. 4160 Volt Systems
   5. Emergency Generators
   6. 125 V.D.C. Systems
   7. Motor Control Centers

b. Boiler Controls and Information Systems
   1. Araby Boiler Control Systems and Subloops
   2. Computer System Consoles
   3. Displays
   4. Alarm CRT
   5. Control Systems
   6. Recorders

c. Operator - Start up Sequence
   1. Batteries
   2. Chargers
   3. Insertions
   4. Diesel Generator
   5. MCC's
   6. Load Centers
   7. Switchgear
   8. Auxilliary Cooling Water
   9. Bearing
   10. Plant Air Systems
   11. Major Transformers
   12. Condensate System
   13. Auxilliary Steam
   14. Fuel Oil System
   15. Steam Coil/regeneratice air heaters
   16. Boiler Ducts
   17. Seal trough
   18. Weir
   19. Penthouse fan
   20. Scanner fans
   21. Sootblower System
   22. FD Fans
   23. Start-up feed pump
   24. Circulating water system
   25. Gas recirculation system
   26. Centrifuge
   27. Pressure raising
   28. Feedwater system
   29. Turbine boiler feed pumps

30. Auto turbine start
31. Primary air fans
32. Pulverizer seal fans
33. Pulverizers
34. BTG controls
35. Feedwater heaters
36. Precipitators
37. Ash system
38. Attemperator spray
39. Boost pumps
40. Halon system

d. Hot Shutdown
   1. Reducing Load
   2. Main Breaker Closure
   3. Shutting Down Mills
   4. Air Heaters
   5. Fans
   6. Feed Premyn
   7. Turbine
   8. Auxilliary Steam
   9. Starter Cooling
   10. Condensate pumps
   11. Gland Seal Systems

e. Cold Shutdown

f. Plant Malfunction

g. Simulator Training

At a minimum of 75% accuracy and/or at industrial standards

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 8/20/83
Review Date:

1. Course Number CHPL, ELEC, FUEL, INME ININ, POPL, SCOP, WAST 270, 272, 274, 276 Title Power Plant Overview I, II, III, IV

Credit Hours 1, 2, 2, 2
Total lecture/recitation hours 105
Total lab/shop hours 0
Semester offered Fall, Spring, Summer

2. Catalog Description:

Interdisciplinary course that requires each apprentice to respond to plant questions dealing with general plant information and material specifics to that individuals trade.

3. Goals:

The student will research various systems, equipment, and technique to compliment the various on-the-job assignments in each year and to pass appropriate yearly test.

4. Student Responsibilities:

The student will be expected to:

A. Research vendor manuals.
B. Know related safety procedures and limits.
C. Research diagrams and prints.
D. Seek additional related information from journeyman and supervisors in both operations and maintenance groups.
E. Have a thorough knowledge of the assigned tasks and to demonstrate this knowledge in the yearly final on plant questions.

5. Evaluation:

A. Supervisor must sign off the apprentices' progress indicating satisfactory performance in learning designated skills.

B. The yearly test covering the field questions will be graded and count as 50% of the yearly grade.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 58%

6. Objectives: The student will:

A. Have an understanding of materials of construction, and the affect of abrasive and corrosive materials found in a power plant environment.

B. Have an understanding of the safety devices, safe application, safety limits, and safety procedures related to their specific system or equipment.

C. have a general understanding of how each system or piece of equipment affects the plant as a whole unit.

D. Be able to identify an emergency situation, evaluate and take proper corrective action.

7. Learning Activities/Methods of Instruction:

Observation of proper methods
Journeymen directives
Shop demonstrations
Vendor presentations
Self-read instructions
Classroom lecture/application

Originator Signature ______________________________

Division Head ____________________________________

SCRUBBER OPERATIONS

SCOP 110	5
SCOP 180	5
SCOP 210	5
SCOP 260	5
Cooperative Education	16
SCOP 280 - 4 Credits SCOP 282 - 4 Credits SCOP 284 - 4 Credits SCOP 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition I - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students - 3 Credits OR any Math course higher than MATH 113 SPCH 110 - Public Speaking - 3 Credits OR SPCH 111 - Speech Communications	
Power Plant Overview	7
SCOP 270 - 1 Credit SCOP 272 - 2 Credits SCOP 274 - 2 Credits SCOP 276 - 2 Credits	
Electives	4
Total Credits	62

SYLLABUS

Date of Origin: 7/8/83
Review Date:

1. Course Number CHPL 110/SCOP 110 Title Chemical Plant Operations I/ Scrubber Operations I
Credit Hours 5
Total lecture/recitation hours 75
Total lab/shop hours 0
Semester offered Fall, Spring, Summer

2. Catalog Description:

This is the initial course in the program and deals with basic mathematics and applied science, auxiliaries, and plant operations emphasizing pollution control systems.

3. Goals:

The student will become familiar with the operation of a power plant with an emphasis in understanding pollution control systems.

4. Student Responsibilities:

The student will be expected to:

A. Attend every class session.
B. Complete assignments on time.
C. Follow safety procedures and guidelines.
D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 68%

6. Objectives: The student will:

A. Have a general understanding of how mathematical operations are performed, how quantities are expressed in relation to other quantities, and how algebraic equation, formulas, and graphs are used to evaluate plant operating conditions and solve problems involving calculations. The trainee will be able to apply learned skills to calculate conditions and solve various problems relating to plant equipment and system operations.

B. Have a understanding of how energy is converted from one form to another in a power plant. They will be familiar with terms such as mass, weight, density, specific gravity, specific volume, viscosity, temperature, and pressure; and they will understand when and how the properties of matter may change. They will be able to read pressure and temperature measurements on a variety of scales, and they will be able to make conversions between pressure units and between temperature units.

C. Have a general understanding of how fluid flows through piping systems and the effect of various types of valves, traps, and strainers on the flow of fluids. They will be familiar with the construction and operation of centrifugal pumps, positive displacement pumps, compressors, fans, and heat exchangers.

D. Have a general understanding of how a power plant produces and distributes electricity. They will know how water and steam flow through the steam cycle in their plant, and they will be familiar with the operation of their plant's boilers, turbines, and condensers and the support systems associated with those major components. They will also have a basic understanding of a plant operator's general responsibilities in normal situations and under emergency conditions.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 7/8/83
Review Date: __________

1. Course Number CHPL 180/SCOP 180 Title Chemical Plant Operations II/ Scrubber Operations II

   Credit Hours 5 Total lecture/recitation hours 75

   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Basic water chemistry, water treatment equipment, plant instrumentation, and plant cycle.

3. Goals:

   The student will have an understanding of how plant systems are affected by water and how the indicating instruments in their plant operate.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a general understanding of how plant systems are affected by water and how water is treated to minimize problems such as corrosion and fouling. They will know how the elements in water react with other substances and what happens when water mixes with chemicals. They will also have a basic understanding of how impurities are removed from water that is used in plant systems.

B. Have a general understanding of how water used in plant systems is treated. They will know how clarifiers, filters, reverse osmosis units, evaporators, zeolite softeners, condensers, de-aerators, and ion exchangers operate, and they will be familiar with the purposes of various chemicals used in the water treatment process. They will know how suspended solids, dissolved solids, and dissolved gases are removed from or controlled in plant water systems, and they will know how the problems caused by corrosion, erosion, scale formation, and biological fouling are minimized.

C. Have a general understanding of how the indicating instruments in their plant operate. They will be able to read various types of gauges and they will understand how information is transmitted from one location to another. They will also be able to interpret the symbols found on Piping and Instrumentation Drawings (P and ID's).

D. The trainees will understand what the plant cycle is and how the properties of water and steam change as fluid flows through the various plant cycle components. They will know how the properties of water and steam are affected by changes in temperature and pressure, and they will know how some of the problems associated with temperature and pressure can be avoided. They will be able to look up values for the properties of water and steam in the steam tables.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Projects
Field Trips

Originator Signature ______________________

Division Head ______________________

SYLLABUS

Date of Origin: 7/8/83
Review Date: ______

1. Course Number CHPL 210/SCOP 210 Title Chemical Plant Operations III/
   Credit Hours 5 Total lecture/recitation hours 75
   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Plant systems, basic electricity, fuel and combustion and boilers.

3. Goals:

   The student will have a basic understanding of electrical theory, boilers, plant systems components, various circuits, and fossil fuels.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives: The student will:

A. Have a general understanding of basic electrical theory and the principles of operation of devices such as batteries, generators, motors, transformers, solenoids, relays, fuses, and circuit breakers. They will be familiar with many of the terms that relate to the production and use of electrical power, and they will appreciate the importance of producing and using electrical power safely and effectively.

B. Understand the operation and function of components found in typical plant systems, and they will know how water and steam flow through these systems. They will be familiar with the symbols used to represent various components on system diagrams, and they will know some of the operator checks that they may be responsible for in maintaining efficient operation of plant systems and components.

C. Be able to explain the steam and water circuits, the air and fuel circuit, the safety and protective devices on boilers, and boiler efficiency.

D. Have a basic understanding of the four requirements for combustion and why fossil fuels burn. They will also have a basic understanding of the components and systems used by their plant for the delivery, transfer, and processing of fuel for use in their plant's boilers and the equipment for handling ash; and they will have a general understanding of a plant operator's responsibilities for checking and maintaining a fuel or ash handling system.

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Projects
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin: 7/8/83
Review Date: ____________

1. Course Number CHPL 260/SCOP 260 Title Chemical Plant Operator IV
Scrubber Operations IV
Credit Hours 5 Total lecture/recitation hours 75
Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

Environmental protection, systems flow and control.

3. Goals:

The student will understand pollution control, design conditions, and various types of equipment critical to scrubber operations.

4. Student Responsibilities:

The student will be expected to:

- A. Attend every class session.
- B. Complete assignments on time.
- C. Follow safety procedures and guidelines.
- D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

A. Apprentices will be periodically tested and graded on daily work and yearly final exam. An average of 75 percent must be maintained on both daily work and the yearly finals.

B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 68%

6. Objectives: The student will:

A. Have a general understanding of why pollution control is important and how it is accomplished by power plant systems and equipment. They will know how plants prevent waste heat, suspended solids, and chemical wastes from polluting the water. They will know how mechanical separators, electrical separators, filter systems, and scrubbers separate particulates from flue gas before the flue gas is released to the environment; and they will know how the production of nitrogen oxides is controlled and how sulfur oxides are removed form flue gas.

B. Will be able to draw in detail all flows and systems within the plant boundaries. The trainee will know all of the design conditions, the function and purpose of each control valve, all interlocks in the systems, and will be familiar with all Standard Operating Procedures.

NOTE: The specific material presented in this portion will be totally different for the Scrubber area compared to the Chemical Plant Operation.

C. Will be familiar with the materials of construction, the theory and design, the vendor's manuals, and the practical application of the following equipment:

1. Scrubber & Absorber Tower
2. Bird Centrifuges and Sharples Centrifuges
3. Durion Filtration System
4. Evaporators - for process solution and water treatment
5. Turbonetic Compressors
6. Refridgeration Systems
7. Sulfuric Acid Plant

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Projects
Field Trips

Originator Signature ______________________

Division Head ______________________

SYLLABUS

Date of Origin: 8/20/83
Review Date:

1. Course Number CHPL, ELEC, FUEL, INME ININ, POPL, SCOP, WAST 270, 272, 274, 276 Title Power Plant Overview I, II, III, IV

Credit Hours 1, 2, 2, 2 Total lecture/recitation hours 105

Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

Interdisciplinary course that requires each apprentice to respond to plant questions dealing with general plant information and material specifics to that individuals trade.

3. Goals:

The student will research various systems, equipment, and technique to compliment the various on-the-job assignments in each year and to pass appropriate yearly test.

4. Student Responsibilities:

The student will be expected to:

A. Research vendor manuals.
B. Know related safety procedures and limits.
C. Research diagrams and prints.
D. Seek additional related information from journeyman and supervisors in both operations and maintenance groups.
E. Have a thorough knowledge of the assigned tasks and to demonstrate this knowledge in the yearly final on plant questions.

5. Evaluation:

A. Supervisor must sign off the apprentices' progress indicating satisfactory performance in learning designated skills.

B. The yearly test covering the field questions will be graded and count as 50% of the yearly grade.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 58%

6. Objectives: The student will:

A. Have an understanding of materials of construction, and the affect of abrasive and corrosive materials found in a power plant environment.

B. Have an understanding of the safety devices, safe application, safety limits, and safety procedures related to their specific system or equipment.

C. have a general understanding of how each system or piece of equipment affects the plant as a whole unit.

D. Be able to identify an emergency situation, evaluate and take proper corrective action.

7. Learning Activities/Methods of Instruction:

Observation of proper methods
Journeymen directives
Shop demonstrations
Vendor presentations
Self-read instructions
Classroom lecture/application

Originator Signature ______________________________

Division Head ____________________________________

INDUSTRIAL WASTE WATER TREATMENT PROGRAM

WAST 110	5
WAST 180	5
WAST 210	5
WAST 260	5
Cooperative Education	16
WAST 280 - 4 Credits WAST 282 - 4 Credits WAST 284 - 4 Credits WAST 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition I - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students - 3 Credits OR any Math course higher than MATH 113 SPCH 110 - Public Speaking - 3 Credits OR SPCH 111 - Speech Communications	
Power Plant Overview	7
WAST 270 - 1 Credit WAST 272 - 2 Credits WAST 274 - 2 Credits WAST 276 - 2 Credits	
Electives	4
Total Credits	62

SYLLABUS

Date of Origin:
Review Date:

1. Course Number WAST 110 Title Wastewater Operations I
   Credit Hours 5 Total lecture/recitation hours 75
   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Introduction to the major systems and components that make up a modern power plant, Mathematics, Chemistry and Physics.

3. Goals:

   The student will be exposed to a broad general background of our power plants function and the application of Math, Chemistry, and Physics in maintaining the operation of the various subsystems.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on weekly work and unit exams. An average of 75 percent must be maintained on both weekly work and unit exams score.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. A = 100 - 92%
   B = 91 - 84%
   C = 83 - 75%
   D = 74 - 68%
   F = Less than 68%

6. Objectives:

The student will be able to define and/or perform specific tasks related to the following concepts.

A. Function of the Power Plant
B. Boilers
C. Turbine Fundamentals
D. Plant Operation
E. Numbers and Number Systems
F. Powers, Roots, and Measurement
G. Algebra
H. Algebra and Graphs
I. Fundamentals of Math Applications
J. Using Formulas
K. Graphs, Charts, and Tables
L. Power Generation Problems
M. Chemistry Concepts
N. Water Chemistry Fundamentals
O. Elementary Water Treatment
P. Water Chemistry Applications
Q. Energy Conversion
R. Properties and Fluid Flow
S. Pressure
T. Temperature and Heat

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin:
Review Date:

1. Course Number WAST 180 Title Wastewater Operations II
Credit Hours 5 Total lecture/recitation hours 75
Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

The course emphasized plant auxilaries, plant instrumentation, basic electricity, water treatment equipment and the water management system.

3. Goals:

Apprentice will gain knowledge of working prinicples of power plant equipment and prepare for wastewater operator position.

4. Student Responsibilities:

The student will be expected to:

A. Attend every class session.
B. Complete assignments on time.
C. Follow safety procedures and guidelines.
D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

A. Apprentices will be periodically tested and graded on weekly work and unit exams. An average of 75 percent must be maintained on both weekly work and unit exams score.

B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

C. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 68%

6. Objectives:

The student will be able to define and/or perform specific tasks related to the following concepts.

A. Fluid Flow, piping and auxilaries
B. Pumps and Drives
C. Compressors and Fans
D. Heat exchangers & Operation of Plant Auxilaries
E. Principles of Instrumentation
F. Pressure and Flow measurement
G. Level and Temperature Measurement
H. Reading Instrumentation on P & ID's
I. Fundamentals of Electricity
J. Batteries, Generators, Motors
K. Transformers and Control Mechanixims
L. Boiler Water Treatment
M. New Water Treatment
N. Ion Exchange
O. Cooling Water Treatment
P. Water Management Systems
Q. Condensate REcovery and Make-up Systems
R. Cooling Tower System
S. The Ash System

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Recitation
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Self-Read Instruction
Simulation
Field Trips

Originator Signature ______________________________

Division Head ____________________________________

SYLLABUS

Date of Origin:
Review Date:

1. Course Number WAST 210 Title Wastewater Operations III
Credit Hours 5 Total lecture/recitation hours 75
Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

Introduction, description and operation of southside and northside wastewater recovery system.

3. Goals:

Student will receive detailed information on the Wastewater Treatment Systems Operation and troubleshooting in preparation as a Wastewater Board Operator.

4. Student Responsibilities:

The student will be expected to:

A. Attend every class session.
B. Complete assignments on time.
C. Follow safety procedures and guidelines.
D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

A. Apprentices will be periodically tested and graded on weekly work and unit exams. An average of 75 percent must be maintained on both weekly work and unit exams score.

B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

C. Fifty percent of the grade will be equivalent to an average of each unit. And the remaining 50% of the final grade will be the units exams.

D. A = 100 - 92%
B = 91 - 84%
C = 83 - 75%
D = 74 - 68%
F = Less than 68%

6. Objectives:

Explain and be able to perform the operation of the North and Southside Wastewater Recovery System. Below is a list of the concepts and equipment to be emphasized:

A. Feed Pretreatment
B. Control Logic
C. Waste Handling
D. Product Storage and Distribution
E. Oxidation System
F. Brine Concentrator #1
G. Brine Concentrator #2
H. Northside Introduction
I. Neutralization System
J. Neutralization
K. Dewatering and Storage
L. Bulk Chemical System
M. Building Services
N. Brine Concentrator #4
O. Brine Concentrator #5

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Simulation
Field Trips
Projects

Originator Signature ______________________________

Division Head ______________________________

SYLLABUS

Date of Origin:
Review Date:

1. Course Number WAST 260 Title Wastewater Operations IV
   Credit Hours 5 Total lecture/recitation hours 75
   Total lab/shop hours 0 Semester offered Fall, Spring, Summer

2. Catalog Description:

   Introduction in reverse osmosis and pretreatment, water softening, clarification, and filtration.

3. Goals:

   This course will prepare the apprentice for Journeyman status in this particular trade.

4. Student Responsibilities:

   The student will be expected to:

   A. Attend every class session.
   B. Complete assignments on time.
   C. Follow safety procedures and guidelines.
   D. Apply the learning experiences in the classroom and laboratory to the on-the-job experiences.

5. Evaluation:

   A. Apprentices will be periodically tested and graded on weekly work and unit exams. An average of 75 percent must be maintained on both weekly work and unit exams score.

   B. If an apprentice does not maintain the required 75 percent grade average, the Committee will either delay advancement or remove the apprentice from the program.

   C. Fifty percent of the grade will be equivalent to an average of each unit. And the remaining 50% of the final grade will be the units exams.

   D. A = 100 - 92%
      B = 91 - 84%
      C = 83 - 75%
      D = 74 - 68%
      F = Less than 68%

6. Objectives:

The student will be able to define and/or perform specific tasks related to the following concepts.

A. RO and Pretreatment Description
B. The RO Clarifier Chemistry
C. The RO Clarifier Operation
D. Lime/Soda Ash Softening
E. Clarification
F. Chemical addition Systems
G. Filtration
H. Media Filter Operation
I. Abnormal Conditions and Maintenance
J. RO Chemical Addition System
K. RO Operation
L. RO Chemistry
M. Diagnosing Permeate Quality
N. RO Membrane Chemical Cleaning
O. RO Membrane Loading
P. RO Maintenance
Q. RO Operational experience and Troubleshooting

7. Learning Activities/Methods of Instruction:

The lecture
Class Discussion
Laboratory
Demonstration
Reading Assignments
Audio-Visual Material
Simulation
Field Trips
Projects

Originator Signature ____________________

Division Head ____________________

Automotive Mechanic (Coal Fired)

Power Plant Mechanical Program

PPME 110	Hydraulics and Engine Tune-up	2 + (6p)	5 Credits
PPME 120	Shop Orientation, Power Train and Heavy Equipment Preventive Maintenance	2 + (6p)	5 Credits
PPME 130	Tune-up, Trouble Shooting and Advanced Engine Repair	2 + (6p)	5 Credits
PPME 140	Basic Engine, Electrical and Fuel Diesel	2 + (6p)	5 Credits
PPME 210	Brakes, Suspension and Steering	2 + (6p)	5 Credits
PPME 220	Electrical Systems and Tune-up	2 + (6p)	5 Credits
PPME 230	Transmission and Power Train	2 + (6p)	5 Credits
PPME 240	Engine Rebuild	2 + (6p)	5 Credits

Cooperative Education 16

PPME 280 - 4 Credits
PPME 282 - 4 Credits
PPME 284 - 4 Credits
PPME 286 - 4 Credits

General Education 15

ENGL 111 - Freshman Composition - 3 Credits
ENGL 218 - Technical Writing - 3 Credits
Humanities Elective - 3 Credits
MATH 113 - Applied Mathematics - 3 Credits
for Vocational Students
OR
any Math course higher
than MATH 113

SPCH 110 - Public Speaking - 3 Credits
OR
SPCH 111 - Speech Communication - 3 Credits

Total Credits 71 Credits

Gerald Nix, Dean of Instruction — 5/13/85 Date

Harris Richard, IAC Chairman — 5/10/85 Date

SJ San Juan
C College
4601 COLLEGE BOULEVARD • FARMINGTON, NEW MEXICO 87401 • 505-326-3311

3:16

February 23, 1983

Mr. Mark Klumph
Public Service of New Mexico
PO Box 227
Waterflow, NM 87421 ph# 598-6641

Dear Mark,

Enclosed are syllabi for the welding and mathematics courses that you requested. Please carefully review the course objectives in each syllabus to be sure that this is the type of instruction that you desire.

Below is an estimate of costs for 36 students to participate in the aforementioned instruction for next fall semester:

Tuition: $15/credit x 3 credits x 36 students = $1620
$10 fee for new students x 36 students = $360
$23/student for textbooks x 36 = $828

TOTAL COST = $2,808.00

This does not include the cost for welding hoods, safety glasses and/or goggles, etc.

Consider this information as a starting point. If you have any questions concerning this matteri, please contact me.

Sincerely,

Bob Huddleston

Bob Huddleston, Ph.D.
Asst. Dean of Instruction
BH/jr

Enclosure

SYLLABUS

Date of Origin: *2-21-83*
Review Date:

1. Course Number *SPTO Weld 295* Title *Basis Structural Welding*

   Credit Hours *2 (1+2P)* Total Lecture/recitation hours *15 hours*

   Total lab/shop hours *30 hrs.* Semester offered *TBA*

2. Catalog Description

   This is a special course designed for industry that stresses the theory and practical application of structural plate welding and flame cutting. Each student will develop skills in medium to heavy plate in all positions using E-6010, E-7018, and E-7024 electrodes.

3. Goals:

   Each student will be able to perform at industrial standards light plate welding, fit-up work and oxygen acetylene cutting.

4. Student Responsibilities:

   The student will be:
   - *a. required to purchase a welding hood, safety glasses, books, and hand tools.*
   - *b. attend every class.*
   - *c. expected to follow safety procedures and guidelines.*

5. Evaluation:

a. Written Tests	*20%*
b. Metal Destructive Test	*50%*
c. Visual Test	*30%*
	100%

6. Objectives:

SEE ATTACHED LIST

7. Learning Activities/Methodis of Instruction:

A. *Lecturing (classroom)*
B. *Films*
C. *Written and Performance Tests*
D. *Field Trips*
E. *Demonstrations*

Originator Signature________________________

Division Head______________________________

OBJECTIVES

1. *To receive a general orientation to the shielded metal arc welding process and define the terms common to all forms of arc welding.*

2. *To know and practice the safety rules for arc welding to provide a safe working environment.*

3. *To develop the ability to properly adjust machine settings, basics of striking the arc, electrode manipulation, and reading the puddle to make sound welds.*

4. *To learn control of bead placement by covering a plate with overlapping beads, and to learn crater filling technique for smoothly finishing the beads at the ends.*

5. *To perform the proper machine settings for 1/8" (3.2) diameter E6012 Electrodes and 3/16 (4.8) inch thick mild steel.*

6. *To have an understanding of the use of deep penetration, E6010 electrodes.*

7. *To develop a technical understanding of poor welding results and provide a checklist for producing quality welds.*

8. *To perform multiple pass fillet welds.*

9. *To perform tee joint welding and perform a practical test that provides measurable standards of acceptability.*

10. *To weld the arc and puddle in the horizontal position.*

11. *To make a sound, 100% penetration open root butt joint.*

12. *To develop a technical understanding of the eight factors to consider in choosing an electrode and learn the American Welding Society's method for classifying electrodes.*

13. *To show the proper techniques of welding fillets, and open root butt joints in the vertical position, to gain full penetration.*

14. *To perform the proper method of electrode manipulation to make a sound multipass tee joint in the vertical position, using up hill travel.*

15. *To perform proper electrode manipulation for making a sound multipass fillet weld by using a semicircular weave technique.*

16. *To perform the practical application of uphill welding on an open root butt joint in the vertical position, where access is available from only one side.*

17. *To understand the different power sources used for welding and introduce various current and voltage characteristics.*

18. *To perform proper electrode manipulation and control of the arc and molten pool for making sound fillet welds on overhead position lap joints.*

Continued...

19. To perform proper bead sequence and control of the arc in making sound multipass fillets in the overhead position.

20. To perform welding tee joints in the overhead position.

21. To perform the proper method and practical applications of welding open root butt joints in the overhead position, where access is available from only one side.

22. To understand the meaning of distortion and the methods of minimizing its effect on welded joints.

23. To perform the proper welding technique for light gage metals.

24. To develop the ability to make good welds on very light gage material.

25. To weld metals of different thickness into a lap-joint.

26. To comprehend the characteristics and manipulation technique for electrodes with high iron powder content.

27. To understand the use of iron powder or heavy coated electrodes.

28. To develop a technical understanding of low hydrogen electrodes, the advantage of low hydrogen electrodes and its numerous applications.

29. To perform the proper manipulation of the low hydrogen electrode to made a sound multipass fillet in the vertical position.

30. To understand the control of the movement pattern and width of each bead on the overhead position tee joint, using low hydrogen electrodes.

31. To develop the ability to properly sequence weld beads, to produce sound large multipass welds, using low hydrogen and iron powder electrodes.

32. To develop a thorough technical understanding of the oxyacetylene flame cutting operation, both manually and by machine.

33. To properly manipulate the cutting torch and to properly set gas pressures to produce the desired flame necessary for making quality square and bevel cuts.

Check list if Appropriate

SYLLABUS

Date of Origin: August 27, 1982
Review Date: ____________

1. Course Number: MATH 107
Title: Elementary Vocational Mathematics
Credit Hours: 3
Total lecture/recitation hours: 38
Total lab/shop hours: ______
Semester offered: Fall, Spring

2. Catalog Description:

Basic applied arithmetic followed by some basic uses of trigonometry and algebra.

3. Goals:

After completing this unit you will be able to apply basic math skills in the trades.

4. Student Responsibilities:

The student will be required to:

A. Attend all class meetings.
B. Complete all class assignments
C. Complete all exams

5. Evaluation:

Hour exams will be given at the end of each chapter.

6. Objectives:

You will be able to:

Add, subtract, multiply and divide whole numbers, fractions and decimals
Compute perimeters, areas and volumes
Use percents and averages
Solve very simple algebraic equations
Construct geometric shapes
Use basic trigonometric functions
Read a micrometer
Set up and use direct and indirect proportions
Use exponents and square roots

7. Learning Activities/Methods of Instruction:

Lecture
Class discussion
Audio visual materials and microcomputer assistance where applicable.

Originator Signature ______________________

Division Head ____________________________

COURSE DESCRIPTIONS

INSTRUMENTATION

INST 150 - APPLIED MECHANICS - STATICS 3 (2+2p)

Study and application of forces on bodies at rest. Prerequisite: PHYS111

INST 220 - PRINCIPLES OF PNEUMATIC CONTROL SYSTEM 4 (2+4p)

Applications of mechanical mechanisms, sensing elements, relays, transmitters control valves and controllers used in pneumatic control. Prerequisite: ET 180.

INST 230 - APPLIED MECHANICS - DYNAMICS 3 (2+2p)

Study and application of forces on bodies in motion including drives, linkages, gearing, pulleys, shafts, etc. Prerequisite: INST 150.

INST 260 - ADVANCED AUTOMATIC CONTROL SYSTEMS 5 (3+4p)

Advanced study and application of pneumatic, hydraulic, and electronic control systems including converters, rational control, cascade control, baton control, and troubleshooting techniques. Application of microprocessor control is included. Prerequisites: INST 220, ET 278.

INST 270 - ROBOTICS 4 (2+4p)

Study and application of automatic control in mechanical systems including use of electrical, electronic, pneumatic, and hydraulic mechanisms. Application of microprocessor control is included. Prerequisites: INST 230, ET 278, INST 220, INST 272.

INST 272 - ELECTRONIC CIRCUITS II 4 (3+3p)

Differential amplifiers, operational amplifiers, positive and negative feedback, pulse and digital circuit response. Prerequisite: ET 160.

INST 290 - INDIVIDUAL PROJECT 1-4

Directed individual project requiring application of understanding and techniques developed in previous courses in program. Prerequisite: Consent of program director.

INST 295 - SPECIAL TOPICS

Special or specific subjects that are offered to meet the needs of the students and industry in technology updating. Specific subjects to be announced in the schedule of classes.

INDUSTRIAL AND ENGINEERING TECHNOLOGY

The Industrial and Engineering Technology programs at San Juan College are designed around a basic interdisciplinary core to provide a flexible and fundamentally sound technical base.

The basic core consists of support courses in mathematics, physics, chemistry, microcomputers, electronics, industrial measurements and drafting. Since the technicians must be able to communicate ideas clearly, courses in English, Technical Writing and Speech are also incldued in the basic core. All technology programs in Industrial and Engineering Technology are built upon this basic core which consists of the following courses:

PHYS 111	Introduction to Physics	4 Credits
COSC 111	Introduction to Computer Science	3 Credits
CHEM 110	Introductory Chemistry	4 Credits
ENGL 111	Freshman Composition I	3 Credits
SPCH 110	Public Speaking	3 Credits
or 111	Speech Communications	
DRFT 110	Technical Drafting	3 Credits
MATH 135	Math for the Technical Student I	3 Credits
ET 140	Applied Basic Electronics- Resistive Circuits	5 Credits
ET 180	Principals of Industrial Measurement	4 Credits
ENGL 218	Technical Writing	3 Credits
	Total	35 Credits

In addition to the basic general core, there are technical core courses common to two or more programs. For instance, Industrial Electronics and Instrumentation Technology have the following common technical courses.

ET 160	Electronic Circuits I	4 Credits
ET 278	Digital Electronics	4 Credits
INST 272	Electronic Ciruits II	3 Credits
INEL 230	Motors and Control	3 Credits
	Total	14 Credits

Taught at SJC

A.A.S. DEGREE REQUIREMENTS
INDUSTRIAL INSTRUMENTATION

ET 140 - Applied Basic Electronics	4 Credits	
ET 160 - Electronic Circuits I	4 Credits	
INST 272 - Electronic Circuits II	3 Credits	
ET 180 - Principles of Industrial Measurements	4 Credits	
INST 220 - Principles of Pneumatic Control Systems	4 Credits	
INST 260 - Advanced Control Systems	4 Credits	
ET 278 - Digital Electronics	4 Credits	
INST 270 - Robotics	4 Credits	31
Cooperative Education		16
ININ 280	4 Credits	
ININ 282	4 Credits	
ININ 284	4 Credits	
ININ 286	4 Credits	
General Education		12
ENGL 111 - Freshman Composition I	3 Credits	
ENGL 218 - Technical Writing	3 Credits	
Humanities Elective	3 Credits	
SPCH 110 - Public Speaking OR SPCH 111 - Speech Communication	3 Credits	
Power Plant Operations		7
ININ 270 - Power Plant Overview I	1 Credit	
ININ 272 - Power Plant Overview II	2 Credits	
ININ 274 - Power Plant Overview III	2 Credits	
ININ 276 - Power Plant Overview IV	2 Credits	
TOTAL CREDITS		66

Date of Origin: ________________

Review Date: January 9, 1984

1. Course Number: ET 140 Title: Applied Basic Electronics - Resistive Circuits

Credit Hours: 5 (3+4P) Total lecture/recitation hours: 75

Total lab/shop hours: 75 Semester offered: Fall

2. Catalog Description:

Basic Fundamentals of Electricity including election theory of current flow; Ohm's law; energy sources; series, parallel and series - parallel circuits calculation, alternating current, inductance, capacitance, transformers, and basic meters.

3. Goals:

Prepare the student for advanced study of electricity.

4. Student Responsibilities:

The student will be:

A. Required to attend every class. Attendance policy is contained in the area Vocational High School Handbook or the College catalog. Missed work will be made up.
B. Expected to complete assigned work on time.
C. Expected to follow safety procedures and guidelines.
D. Expected to maintain a clean shop.

5. Evaluation:

A. Tests will be given five times each semester including the final exam.

B. Grades:

a.	Exams	60%
b.	Lab activities	30%
c.	Homework	5%
d.	Attitude*	5%
		100%

*Attitude covers class participation, attendance and behavior.

c. Grades are determined as follows:

A = 100% - 90%
B = 89% - 80%
C = 79% - 70%
D = 69% - 60%
F = 59% - Below

Make up will be provided upon application. Extra credit will be arranged with the instructor. Lab activities will be done at individual pace speed. A semester evaluation will be given each individual during the semester and will include safety procedures, use of equipment and ability to relate lab work to theory. The minimum work required for passing is established at 80% of assigned tasks.

6. Objectives:

After completion of this unit the student will:

A. Use basic test equipment to measure electrical components, read and analyze circuit values from actual circuits.

B. Calculate unknowns in Ohm's law, given two known values and the type of circuit.

C. Explain the difference between A.C. and C.C. and list sources of each.

D. Explain operation of basic sources of voltage.

E. Explain the basic idea of the election theory of current flow.

F. Calculate values in AC circuits with reactive components using Ohm's law.

G. Know the basic idea of energy transfer and calculate values in simple circuits.

H. Read schematic diagrams and sketch schematics of actual circuits.

7. Learning Activities/Methods of Instruction:

A. Text material

B. Classroom discussion

C. Audio visual material

D. Lecture

E. Homework assignments

F. Lab experiments

Originator Signature: ____________________

Division Head: ____________________

SYLLABUS

1. Course Number: ET 160 Title: Electronic Circuits I

Credit Hours: 5 (3+4p) Total lecture/recitation hours: 75

Total lab hours: 75 Semester offered: Spring

2. Catalog Description:

Semiconductors, diodes, power supplies, transistors, amplifiers, operational amplifiers, electronic control devices and circuits.

3. Goals:

To provide the student with a basic understanding of electronic fundamentals and devices, including the proper use in circuits.

4. Student Responsibilities:

The student will be:

A. Required to attend every class. Attendance policy is prescribed in the college catalog or the area High School Handbook. Opportunity may be provided for makeup of missed work.
B. Required to complete class and lab assignments on time.
C. Required to follow safety procedures and guidelines.
D. Required to maintain a clean lab and classroom area.

5. Evaluation:

A.	Examinations	40%	A = 90 - 100%
B.	Lab Learning Activities	30%	B = 80 - 89%
C.	Attendance	5%	C = 70 - 79%
D.	Homework	20%	D = 60 - 69%
E.	Class participation and attitude	5%	F = 59% or below

1. Attendance as prescribed by the appropriate handbook is the minimum required. Excess absence or tardiness will reduce grades 1% for each occurence.
2. The instructor will evaluate class participation and attitude throughout the semester.
3. Makeup will be provided upon application to the instructor. Extra credit may also be requested.
4. Lab activities will be completed at an individual pace. A semester evaluation will be given each individual during the course work and will include safety procedure, use of equipment and ability to relate lab work to theory. The minimum work required for a passing lab grade is established at 80% of assigned work.

6. Objectives:

   A. Use test equipment to measure circuit operations from actual prototype circuits.

   B. Calculate component values for proper operation of a prototype circuit.

   C. Describe each type of basic circuit, construct a prototype of each, and analyze each for correct operation.

   D. Identify each type of basic circuit from schematics.

   E. Analyze a circuit for proper operation, find any defective component and replace same.

7. Learning Activities/Methods of Instruction:

   A. Text material

   B. Classroom discussion

   C. Audio visual material

   D. Lecture

   E. Homework assignments

   F. Lab Experiments

Originator Signature: ____________________

Division Head: ____________________

SYLLABUS

Date of Origin: ____________

Review Date: January 9, 1984

1. Course Number: INST 272 Title: Electronic Circuits II

   Total Lab/Shop Hours: 45 Total lecture/recitation hours: 45

2. Course Description:

   Differential amplifiers, operational amplifiers, positive and negative feedback, pulse and digital circuits response. Emphasis on integrated circuits. Prerequisite: ET 246. Corequisite: MATH 235.

3. Goals:

   Mastery of the principles of digital networks and application of these principles to digital components and circuits.

4. Student Responsibilities:

   Acquire the required textbook
   Attend class regularly
   Participate in class discussions
   Take exams as scheduled
   Do assigned homework

5. Evaluation:

   Evaluation will be five major examinations and occasional quizzes. Exams will involve 4 to 5 problems.

6. Objectives:

Upon completion of the course the student will be able to:

A. Effectively use typical electronic test equipment.
B. Analyze and design a typical digital circuit
C. Troubleshoot and repair typical digital circuits and electronic parts.

7. Learning Activities/Methods of Instruction:

Lecture
Class Discussion
Textbook Reading
Experimentation

Originator Signature ____________________
Division Head ____________________

SYLLABUS

Date of Origin: February 1984
Review Date: ______________

1. Course Number: ET 180 Title: Principles of Industrial Measurement

   Credit Hours: 4 (2+4p) Total Lecture/recitation hours: 30

   Total lab/shop hours: 60 Semester Offered: Fall and Spring

2. Catalog Description:

   The application of the basic concepts of Physics 111 are studies including industrial techniques for the measurement of acceleration, displacement, force, temperature pressure flow and etc. Typical industrial transducers and sensing elements are included. Prerequisite: MATH 135, PHYS 111 and ET 140

3. Goals:

   The student will understand basic measurement techniques and the use of typical instruments and transducers in applying these techniques.

4. Student Responsibilities:

   a. To attend class regularly.
   b. To complete work assignments on time. Any missed assignments must be made up.
   c. To follow safety procedures and guidelines.
   d. To maintain a clean shop and classroom area.

5. Evaluation:

   a. A minimum of six written examinations and one lab examination are given during the semester.
   b. Grades

Average of exams	70%
Lab activiites	20%
Attitude *	10%

*Attitude includes attendance, class participation and general behavior.

5. Continued

C. Grades are determined as follows:

59 or below = F
60 - 69% = D
70 - 79% = C
80 - 89% = B
90 -100% = A

6. Objectives:

Upon the successful completion of the course the student will be able to:

1. Demonstrate proficiency in the use of mechanical measuring instruments such as micrometers, vernier calipers, analytical balances, etc. by performing lab experiments with these instruments.
2. Demonstrate proficiency in the use of pressure measuring instruments such as manometers & pressure gauges in both hydraulic and pneumatic systems by performing lab experiments with these instruments.
3. Demonstrate proficiency in the use of common methods for determining liquid level such as float and cable, buoyany, capacitance and weight by performing lab experiments using instruments employing these various methods.
4. Demonstrate proficiency in the use of common liquid density instruments utilizing the effect of density changes on weight as the basic measurement method. Laboratory experiments will verify this proficiency.
5. Demonstrate proficiency in the use of typical fluid flow instruments such as displacement flow meters, differential flow meters, velocity flow meters and mass flow meters. Laboratory experiments using these meters will verify proficiency.

   Demonstrate proficiency in the use of temperature sensors such as thermometers, resistance temperature detectors, thermisters and bimetallic devices by performing lab experiments using these various sensing elements.

7. Learning Activities/Methods of Instruction:

A. Testing
B. Lecture
C. Classroom discussion
D. Lab assignments
E. Audio Visual materials

Originator Signature ____________________

Devision Head ___________________________

SYLLABUS

Date of Origin: February 84

Review Date:

1. Course Number INST 220

Title Principles of Pneumatic Control Systems

Credit Hours 4

Total Lecture/recitation hours 30

Total lab/shop hours 60

Semester offered Spring

2. Catalog Description

Applications of mechanical mechanisms, sensing elements, relays, transmitters, control valves and controllers used in pneumatic control. Prerequisite: ET 180

3. Goals:

The student will understand basic pneumatic control systems and will apply this understanding in laboratory experiments.

4. Student Responsibilities:

   a. To attend class regularly
   b. To complete work assignments on time. Any missed assignments must be made up.
   c. To follow safety procedures and guidelines
   d. To maintain a clean shop and classroom area

5. Evaluation:

   A. A minimum of six written examinations and one lab examination are given during the semester.
   B. Grades

Average of exams	70%
Lab Activities	20%
Attitude *	10%

* Attitude includes attendance, class participation and general behavior.

5. Continued

C. Grades are determined as follows:

59 or below = F
60 - 69% = D
70 - 79% = C
80 - 89% = B
90 -100% = A

6. Objectives:

Upon the successful completion of the course the student will be able to:

1. Demonstrate learned skills in the use of pneumatic recorder pressure transmitter by performing lab experiment using these instruments.
2. Demonstrate learned skills in the use of force-balance pneumatic pressure transmitters by performing lab experiments with these instruments.
3. Demonstrate learned skills in the use of absolute pressure transmitters by performing lab experiments using these instruments.
4. Calibrate and repair the above instruments.
5. Calculate and analyze controllers and control systems and verfiy these calculations through laboratory experiments.

7. Learning Activities/Methodis of instruction:

A. Testing
B. Lecture
C. Classroom discussion
D. Lab assignments
E. Audio Visual materials

Originator Signature R. Ives

Division Head

SYLLABUS

Date of Origin: February 84

Review Date:

1. Course Number: INST 260 Title Advanced Automatic Control Systems

Credit Hours: 5 (3+4p) Total Lecture/recitation hours: 45

Total lab/shop hours: 60 Semester offered Spring

2. Catalog Description:

Advanced study and application of pneumatic, hydraulic and electronic control systems including P/I and I/P converters, ratio control, cascade control and trouble shooting techniques. Application of microprocessor control is included.

Prerequisite: INST 220, ET 278 and INST 272.

3. Goals:

The student will understand basic automatic control systems and will apply this understanding in laboratory experiments.

4. Student Responsibilities:

A. To attend class regularly
B. To complete work assignments on time. Any missed assignments must be made up.
C. To follow safety procedures and guidelines
D. To maintain a clean shop and classroom area

5. Evaluation:

A. A minimum of six written examinations and one lab examination are given during the semester.
B. Grades

Average of exams	70%
Lab Activities	20%
Attitude *	10%

* Attitude includes attendance, class participation and general behavior.

5. Continued

C. Grades are determined as follows:

59 or below = F
60 - 69% = D
70 - 79% = C
80 - 89% = B
90 -100% = A

6. **Objectives:**

Upon the successful completion of the course the student will be able to:

1. Analyze and trouble shoot pneumatic control systems, identify and repair any faulty block in the total control system.
2. Analyze and trouble shoot hydraulic control systems and identify and repair any faulty block in the total control system.
3. Analyze and trouble shoot electronic control systems and identify and repair any faulty block in the total control system.
4. Analyze and trouble shoot control systems involving both pneumatic and electronic controls such as pressure-to-current and current-to-pressure convertors.
5. Demonstrate skill in application of microprocessor control to system by performing laboratory experiments using microprocessors in the control system.

7. Learning Activities/Methods of Instruction:

A. Testing
B. Lecture
C. Classroom discussion
D. Lab assignments
E. Audio Visual materials

Originator Signature ____________________

Division Head ____________________

ASSOCIATE OF APPLIED SCIENCE
INSTRUMENTATION TECHNOLOGY

Instrumentation technology is one of the fastest growing and most complex segments of industry. Instrumentation deals with process control and involves the use of electrical, electronic, pneumatic, hydraulic and mechanical mechanisms to control industrial processes.

The instrumentation program provides the students with the broad fundamental concepts and skills needed to succeed in the instrumentation profession.
add paragraph referring to "length of time". (see Industrial electronics program

FIRST SEMESTER

PHYS 111	Introduction to Physics	4 Credits
ET 140	Applied Basic Electronics - Resistive Circuits	5 Credits
MATH 135	Mathematics for Technical Student I	3 Credits
ENGL 111	Freshman Composition	3 Credits
DRFT 110	Technical Drafting	3 Credits
	Total	18 Credits

SECOND SEMESTER

ET 180	Principles of Industrial Measurement	4 Credits
CHEM 110	Introductory Chemistry	4 Credits
ET 160	Electronic Circuits I	4 Credits
INST 150	Applied Mechanics - Statics	3 Credits
4 6 COSC ~~111~~ 130	Introduction to ~~Microcomputers~~ COMPUTER SCIENCE	3 Credits
	Total	18 Credits

THIRD SEMESTER

INST 220	Principles of Pneumatic Control Systems	4 Credits
ET 278	Digital Electronics	4 Credits
INST 230	Applied Mechanics - Dynamics	4 Credits
INEL 230	Motors and Controls	3 Credits
INST 272	Electronic Circuits II	3 Credits
	Total	18 Credits

FOURTH SEMESTER

INST 260	Advanced Automatic Control Systems	5 Credits
ENGL 218	Technical Writing	3 Credits
SPCH 110	Public Speaking	3 Credits
INST 270	Robotics	4 Credits
	OR	
INST 290	Individual Project	1-4 Credits
	Humanities/Social Science Elective	3 Credits
	Total	18 Credits

TOTAL CREDITS	72 Credits

Option: INST 280 Cooperative Work Experience 1-12 Credits may be substituted for course work during third and fourth semester with approval of the program/instructor.

SYLLABUS

Date of Origin: ____________

Review Date: January 9, 1984

1. Course Number: Phys 111 Title Introduction to Physics

Credit Hours: 4 Total Lecture/recitation hours: 50

Total lab/shop hours: ________ Semester offered Fall & Spring

2. Catalog Description:

A primarily conceptual approach to classical physics; mechanics, heat, sound, optics, electricity, and magnetism. Intended for non-science majors and science majors who have not had high school physics. Prerequisite: Math 102 or Math Placement Test.

3. Goals:

The student will understand the principles of classical physics. The student will have practice in reading with understanding and with critial reasoning.

4. Student Responsibilities:
   - A. They are expected to attend class regularly.
   - B. They will provide the required textbook
   - C. They will use pencil on all examinations.
   - D. They are expected to participate actively in class discussion and chalk board problem sessions.
   - E. Take exams as scheduled

5. Evaluation:

Evaluation is be seven exams and homework collected.

6. Objectives:
The student will be able to:

A. solve reasoning problems based on the physical principles involved in described situations.
B. solve relatively simple mathematical applications of classical physics.

7. Learning Activities/Methods of Instruction:

Lecture-discussion, demonstration and microcomputer tutorial methods are used.

Originator Signature ______________________

Division Head ______________________

APPENDIX 3

SAN JUAN GENERATING STATION

DO YOU WANT TO EARN
AN ASSOCIATE OF APPLIED SCIENCE DEGREE?

Training Department

NON-DISCRIMINATION POLICY

It is the policy of San Juan College not to discriminate on the basis of sex, handicap, race, religion, national or ethnic origin in its admission policies, educational programs, financial aid, or other school administered programs. This policy is enforced by federal law under Title IX of the Educational Amendments of 1972, Title VI of the Civil Rights Act of 1964, and Section 504 of the Rehabilitation Act of 1973.

San Juan College

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San Juan
College

4601 COLLEGE BOULEVARD • FARMINGTON, NEW MEXICO 87401 • 505-326-3311

Dear Public Service Company of New Mexico Employee:

I would like to introduce you to a very exciting program which has been made available to you through an agreement between the Public Service Company of New Mexico San Juan Plant and San Juan College.

You are very fortunate to be employed by a company which is interested enough in you as an individual to offer educational services through a planned educational program.

Education is a life-long process and you have the opportunity to further your education with the assistance of PNM and San Juan College providing financial and educational services.

All of the information and forms needed for you to take advantage of this benefit are included in this booklet. If you should have any questions or need more information, please feel free to contact me at 326-3311 extention 216. I am available to meet with you personally at PNM or on campus.

Sincerely,

Joseph J Rodman

Joseph J. Rodman
Director of Cooperative Education

JJR:kc

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INTRODUCTION TO SAN JUAN COLLEGE

PHILOSOPHY

San Juan College strives to provide education and service to all members of the college's service area who could benefit from its programs. In so doing, San Juan College asserts these fundamental beliefs:

> We believe in the inherent worth and potential of every individual, regardless of race, sex, age, socio-economic group, or other factors, and pledge ourselves to provide a variety of programs and activities to develop that potential. We believe that San Juan College should be strongly community based and anticipate as well as respond to the changing needs of the community, while at the same time remaining accountable to its constituency.
>
> We believe San Juan College should be performance oriented in its educational programs with appropriate methods of evaluating the success or failure of programs.
>
> We believe that education is a life-long process and that every individual has a capacity for life-long learning. The community college should be a fundamental provider in this quest.
>
> We believe San Juan College should promote cultural pursuits, open up new areas of community interest, and offer leadership in promoting cultural appreciation with the community in general.
>
> We believe we have a responsibility to our community and nation in assisting in the solutions of great problems that affect us at every level.

MISSION

The mission of San Juan College is to assess the educational and human needs of the entire community in concert with other community agencies and groups; to assist in meeting these needs through identification of potential clientele, assessment of resources, removal of access barriers, development and implementation of curriculum and services, and maintenance of accountability in all of its activities.

To put this mission into action, there is an agreement between Public Service Company of New Mexico San Juan Plant and San Juan College to promote training through a planned educational experience.

San Juan College is providing credit for approved courses taught at Public Service Company of New Mexico San Juan Plant. This agreement could enable you to earn an Associate of Applied Science degree from San Juan College.

The college assists in the development of curriculum and flexible class scheduling for all approved programs or courses.

The college is allowing PNM employees to change courses as prescribed in the San Juan College catalog.

The college is offering general education courses at the San Juan Plant to facilitate PNM employees in obtaining an A.A.S. degree.

The following are programs which have already been established:

ASSOCIATE OF APPLIED SCIENCE

San Juan College offers a wide range of occupational training programs and job upgrading classes to meet the needs of the community.

Curricula are designed to provide the educational skills and practical experiences necessary to enable a student to enter an occupational field. An Associate of Applied Science degree is designed to provide the student with employable skills after completing the two-year degree. The Associate of Applied Science degree is not intended to transfer to another institution although many of the courses within the degree may transfer. These degrees have core requirements and general education requirements. The general education requirements prepare the student to cope with life situations and job advancement.

Any student seeking an Associate of Applied Science degree must complete a minimum of 15 credit hours of general education. These are:

English	*6 credits*
(ENGL 111 and one other determined by department.)	
Mathematics	*3 credits*
(Must be numbered 110 or higher)	
Speech	*3 credits*
Humanities/Social Science Elective	*3 credits*
TOTAL	*15 credits*

Please refer to the appropriate curriculum for the specific requirements. The Humanities or Social Science elective must be selected from the following courses:

Anthropology - any course offered with the exception of field archaeology
Art - any course that is not an applied art course
Drama - any non-applied drama course
Economics - any course offered unless it is already required for the degree plan
English - any literature course (does not include those required for composition courses)
Government - any course offered
History - any course offered
Music - any non-applied music course
Philosophy - any course offered
Psychology - any course offered
Sociology - any course offered

COOPERATIVE EDUCATION PROGRAM: *Many programs at San Juan College offer college credit for on-the-job training which may substitute for certain required courses or count as electives if prior arrangements are made. This option in the curriculum is called Cooperative Education.*

The term Cooperative Education means a method of education for students who receive instruction through a cooperative arrangement between the college and employers. These experiences must be planned and supervised by the college and employers so that each contributes to the student's education and employability.

The objective of Cooperative Education is to provide training in specific areas for students, especially when equivalent training is not normally available in the students' program. Cooperative Education also provides students with supervised real work experience that will be advantageous when attempting to secure permanent employment upon graduation.

The Cooperative Education program must be a planned program designed to enhance the students learning experience by coordinating actual on-the-job training that will provide relevant learning experiences which are directly related to career and educational goals.

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CREDIT BY COURSE CHALLENGE 01-16-84

Any currently enrolled student with regular admission status and not on academic or disciplinary probation may challenge by examination any approved course listed in the current general catalog in which credit has not been previously earned except as an independent study, research or reading course. The manner of administering the examination and granting permission shall be determined by the department in which the course is being challenged.

A student must be currently enrolled in order to challenge a course. A student may not enroll in a single course, challenge it by examination and drop the course during the DROP-ADD PERIOD, unless enrolled in an additional course. Likewise, withdrawal from all classes prior to the end of the semester cancells a course challenged during that semester.

In exceptional cases in which a student demonstrates outstanding ability in a course in which registration has been completed, the student may be permitted to challenge the course with the approval of the Director of Admissions-Records and the Dean of Instruction.

The challenge examination will be graded by the instructor and recorded on the AD-89 COURSE CHALLENGE REQUEST-RECORD form. A grade of "D" or below will not be recorded on the student transcript. No refund will be issued for a failing grade. A grade of "C" or better will be recorded on the transcript as "CE" and is not included in the calculation of cumulative GPA for the student.

A student desiring to apply for special examination may obtain the necessary forms from the Student Records Office. Payment must be made at the time the form is issued and in all cases, prior to the instructor administering the test.

Upon completion of all required information on the AD-89 COURSE CHALLENGE form, including the final test, the form will be routed as follows:

01. AD-01 STUDENT RECORD FOLDER

02. STUDENT COPY

The copy of the AD-89 form will serve as the notice of official grade to the student when the grade has been recorded into the records system.

COSTS .... The costs for all course challenges are the same as the per credit hour costs for resident tuition. All challenge costs are in addition to any amounts paid for regular program registration tuition.

DEADLINE .... Completed forms for course challenges must be submitted by the instructor no later than fifteen (15) class days before the last day of instruction for the semester to be entered into the semester records.

No record of a course challenge will appear on the student transcript until the end of the semester during which the examination was completed and submitted to the Office of Admissions-Records.

All copies of the AD-89 must be returned to the Office of Admissions-Records by the instructor. Forms given to students after the examination has been completed and recorded will not be accepted and will result in the course challenge request being invalidated.

PNM

CHEMICAL PLANT OPERATIONS

CHPL 110	5
CHPL 180	5
CHPL 210	5
CHPL 260	5
Cooperative Education	16
CHPL 280 - 4 Credits CHPL 282 - 4 Credits CHPL 284 - 4 Credits CHPL 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition - 3 credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students - 3 Credits OR any Math course higher than MATH 113 SPCH 110 - Public Speaking - 3 Credits OR SPCH 111 - Speech Communications	
Power Plant Overview	7
CHPL 270 - 1 Credit CHPL 272 - 2 Credits CHPL 274 - 2 Credits CHPL 276 - 2 Credits	
Electives	4
Total Credits	62

PNM

ELECTRICAL PROGRAM

ELEC 110	5 (4+2p)
ELEC 180	5 (4+2p)
ELEC 210	5 (4+2p)
ELEC 260	4 (3+2p)
Cooperative Education ELEC 280 - 4 Credits ELEC 282 - 4 Credits ELEC 284 - 4 Credits ELEC 286 - 4 Credits	16
General Education ENGL 111 - Freshman Composition 1 - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students OR any Math course higher than MATH 113 - 3 Credits SPCH 110 - Public Speaking OR SPCH 111 - Speech Communications - 3 Credits	15
Power Plant Overview ELEC 270 - 1 Credit ELEC 272 - 2 Credits ELEC 274 - 2 Credits ELEC 276 - 2 Credits	7
Electives	5
Total Credits	62

PNM

FUEL AND WATER PROGRAM

FUEL 110	5
FUEL 180	5
FUEL 210	5
FUEL 260	5
Cooperative Education	16
FUEL 280 - 4 Credits FUEL 282 - 4 Credits FUEL 284 - 4 Credits FUEL 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition I - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students OR any Math course higher than MATH 113 - 3 Credits SPCH 110 - Public Speaking OR SPCH 111 - Speech Communications - 3 Credits	
Power Plant Overview	7
FUEL 270 - 1 Credit FUEL 272 - 2 Credits FUEL 274 - 2 Credits FUEL 276 - 2 Credits	
Electives	4
Total Credits	62

PNM

INDUSTRIAL INSTRUMENTATION

PHYS 111	4 Credits
ET 180	4 Credits
ET 160	4 Credits
INST 220	4 Credits
INST 272	3 Credits
INST 260	5 Credits
ET 140	5 Credits
Cooperative Education	16
ININ 280	4 Credits
ININ 282	4 Credits
ININ 284	4 Credits
ININ 286	4 Credits
General Education	15
ENGL 111 - Freshman Composition I	3 Credits
ENGL 218 - Technical Writing	3 Credits
Humanities Elective	3 Credits
Math 115	3 Credits
SPCH 110 - Public Speaking or SPCH 111 - Speech Communication	3 Credits
Power Plant Operations	7
ININ 270	1 Credit
ININ 272	2 Credits
ININ 274	2 Credits
ININ 276	2 Credits
Total Credits	67

PNM

INDUSTRIAL MECHANICS

INME 110	5 (4+2p)
INME 180	4 (3+2p)
INME 210	4 (3+2p)
INME 260	5 (5+1p)
PNM Welding I	3 (2+1p)
PNM Welding II	2 (1+2p)
Cooperative Education	16
INME 280 - 4 Credits INME 282 - 4 Credits INME 284 - 4 Credits INME 286 - 4 Credits	
General Education ENGL 111 - Freshmen Composition - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathmetics for Vocational Students OR any Math course higher than MATH 113 - 3 Credits SPCH 110 - Public Speaking - 3 Credits OR SPCH 111 - Speech Communications	7
Power Plant Overview	
INME 270 - 1 Credit INME 272 - 2 Credits INME 274 - 2 Credits INME 276 - 2 Credits	
Electives	1 or more
Total Credits	62

PNM

POWER PLANT OPERATIONS

POPL 110	6
POPL 180	6
POPL 210	6
POPL 260	3
Cooperative Education	16
POPL 280 - 4 Credits POPL 282 - 4 Credits POPL 284 - 4 Credits POPL 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition I - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics - 3 Credits for Vocational Students OR any Math course higher than MATH 113 SPCH 110 - Public Speaking - 3 Credits OR SPCH 111 - Speech Communications	
Power Plant Overview	7
POPL 270 - 1 Credit POPL 272 - 2 Credits POPL 274 - 2 Credits POPL 276 - 2 Credits	
Electives	3
Total Credits	62

PNM

SCRUBBER OPERATIONS

SCOP 110	5
SCOP 180	5
SCOP 210	5
SCOP 260	5
Cooperative Education	16
SCOP 280 - 4 Credits SCOP 282 - 4 Credits SCOP 284 - 4 Credits SCOP 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition I - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students - 3 Credits OR any Math course higher than MATH 113 SPCH 110 - Public Speaking - 3 Credits OR SPCH 111 - Speech Communications	
Power Plant Overview	7
SCOP 270 - 1 Credit SCOP 272 - 2 Credits SCOP 274 - 2 Credits SCOP 276 - 2 Credits	
Electives	4
Total Credits	62

PNM

WASTE WATER OPERATIONS PROGRAM

WAST 110	5
WAST 180	5
WAST 210	5
WAST 260	5
Cooperative Education	16
WAST 280 - 4 Credits WAST 282 - 4 Credits WAST 284 - 4 Credits WAST 286 - 4 Credits	
General Education	15
ENGL 111 - Freshman Composition I - 3 Credits ENGL 218 - Technical Writing - 3 Credits Humanities Elective - 3 Credits MATH 113 - Applied Mathematics for Vocational Students OR any Math course higher than MATH 113 - 3 Credits SPCH 110 - Public Speaking OR SPCH 111 - Speech Communications - 3 Credits	
Power Plant Overview	7
WAST 270 - 1 Credit WAST 272 - 2 Credits WAST 274 - 2 Credits WAST 276 - 2 Credits	
Electives	4
Total Credits	62

PNM

Post Office Box 227 / Waterflow, New Mexico 87421

EDUCATIONAL ASSISTANCE PROGRAM
POLICY STATEMENT

PNM encourages its employees to participate in educational programs that will expand their knowledge and skills in areas related to the operations of the Company. The Employee Development Department will provide educational counseling for those employees desiring assistance in educational planning. All arrangements of courses and/or subjects shall be between the employee and the school. The employee shall be solely responsible for payment of all tuition and other expenses.

Regular employees and part-time employees are eligible to participate in the Educational Assistance Program provided that the following conditions are met:

1. The course material or type of degree must create a skill that is needed within PNM and should be related to the employee's profession, skill or craft.

2. The course material or type of degree must be able to be used effectively within PNM.

3. The course material or type of degree shall not pertain to hobbies, recreation, or non-work related self-improvement. Supervisors are responsible to ensure that all courses to be taken by the employee are legitimate and appropriate.

4. Departmental training efforts required or recommended for all employees will not be considered.

5. The educational institution offering Degree Programs (those curricula that offer, as a final certificate, an associates, bachelor's, master's, or doctor's degree) must be recognized and certified as an educational institution of higher learning by either the state or federal government.

6. Technical school courses (non-degree, Certificate of Completion, or course diploma) are considered.

7. Correspondence courses (non-degree, Certificate of Completion, or course diploma) are considered for approval when such courses meet all policy standards, and in addition, provide the only means available to an employee to further his or her education. Before making any kind of commitment on a correspondence course, the employee must discuss his/her plans with the department supervisor and the Employee Development Department. When submitting application for educational assistance, the employee must provide a complete course description and cost of course material. All IRS regulations wll apply.

8. A satisfactory grade of at least a "C" must be achieved.

9. The program provides for reimbursement of tuition fees only. Costs for required course books are not reimbursable.

   Lodging, boarding, transportation, parking fees, postage, typing fees, graduation fees, supplies, equipment or hardware prices, and/or any other incidental expenses are not reimbursable.

10. Reimbursement will not be made for courses completed after employment is terminated.

Amount of Reimbursement*

1. Regular employees will receive 100% reimbursement for tuition only.

2. Part-time employees will receive 50% reimbursement for tuition only.

RECORDS

Employee Development will incorporate into each employee's personnel file all grades and certificates submitted at the time reimbursement is requested. However, PNM employees will be responsible for updating education material in their personnel files.

*Employees enrolled or in receipt of a grant or scholarship will receive their specified percentage reimbursement less any portion of monies received by the Statement program, grant or scholarship.

See Educational Assistance Program Procedure 413.4

INSTRUCTIONS: Prepare in triplicate. Forward to immediate supervisor **no later than two weeks before the starting date** for the course(s). Immediate supervisor should follow departmental procedures for recommendations. Application is then forwarded to Employee Development, for approval. If you plan to enroll in courses at more than one school, submit application for each school. Receipts for reimbursement **must be submitted within 30 days after completion of course(s).**

PUBLIC SERVICE COMPANY OF NEW MEXICO

EDUCATIONAL ASSISTANCE APPLICATION

EMPLOYEE COMPLETE THIS SECTION

NAME (1)	EMPLOYED STATUS ☐FULL TIME ☐PART TIME	EMPLOYEE NO (2)	EMPLOYMENT DATE (3)	DATE (4)
POSITION (5)	DEPARTMENT (6)	(7) ☐EXEC PAYROLL ☐REG SAL PLAN ☐ADMIN SAL PLAN ☐UNION SAL PLAN		
MAILING LOCATION (8)	EXTENSION	DIVISION (9)	(10) ☐ NEW APPLICATION ☐ CONTINUING PROGRAM	
NAME OF SCHOOL OFFERING COURSE (11)	ARE YOU RECEIVING OTHER REIMBURSEMENT FOR EDUCATION (GI BILL, GRANT, ETC.)? HOW MUCH? (13)		YES	NO
LOCATION (12)				
TYPE OF DEGREE/CERTIFICATE DESIRED (14)	FIELD OF STUDY (15)	TOTAL UNITS REQUIRED FOR DEGREE (16)	UNITS EARNED TO DATE TOWARD DEGREE (17)	

DATE CLASS		TIME OF CLASS	ITEM NO	COURSE NO	COURSE TITLE (18)	UNITS	GRADE RECEIVED	EXPECTED DATE OF GRADUATION
BEGINS	ENDS							
			A					
			B					APPROX FEES
			C					TUITION $
			D					REGISTRATION $
			E					TOTAL $

DEPARTMENTAL RECOMMENDATION

(19)

☐ APPLICATION RECOMMENDED FOR APPROVAL

☐ APPLICATION NOT RECOMMENDED FOR APPROVAL

FOR DETERMINING TAX STATUS, EMPLOYEE'S MANAGER MUST ANSWER THE FOLLOWING: (20)

Does each course maintain or improve skills required in performing the duties of the employee's present job? *Check appropriate box for each item below:*

ITEM A	ITEM B	ITEM C	ITEM D	ITEM E
☐YES ☐NO	☐YES ☐NO	☐YES ☐NO	☐YES ☐NO	☐YES ☐NO

REASON (21)

EMPLOYEE IS PERFORMING SATISFACTORILY ON JOB. ☐YES ☐NO (22)

SUPERVISOR'S SIGNATURE (23)	EXTENSION	DATE	DEPARTMENT/DIVISION HEAD SIGNATURE (24)	DATE

FORWARD APPLICATION TO EMPLOYEE DEVELOPMENT FOR APPROVAL

☐ The following amount will be reimbursed to applicant upon successful completion of the course(s) listed above and in accordance with the Educational Assistance policy. $ ____________

☐ Reimbursement will not be made because ____

	EMPLOYEE DEVELOPMENT AUTHORIZATION	DATE

Amount actually reimbursed . . . . $ ____________

Remarks ____

WHITE-TRAINING DEPT. CANARY-DIVISION OFFICE PINK-EMPLOYEE

PNM 1992 11/82

PNM

Post Office Box 227 / Waterflow, New Mexico 87421

PUBLIC SERVICE COMPANY OF NEW MEXICO
EDUCATIONAL ASSISTANCE
CERTIFICATE OF EXPENSES

THIS FORM MUST ACCOMPANY *ALL* REQUESTS FOR EDUCATIONAL REIMBURSEMENT.

I, ______________________ (NAME) certify that the expenses listed below were incurred from taking ______________________ (COURSE(S)) at ______________________ (SCHOOL) and are within the guide lines of the Educational Reimbursement Program.

CHECK ONE

☐ FULL TIME EMPLOYEE

☐ PART TIME EMPLOYEE

TUITION $ __________

REGISTRATION FEE __________

TOTAL $ __________

EMPLOYEE SIGNATURE	SUPERVISOR SIGNATURE	EMPLOYEE DEVELOPMENT SIGNATURE

PLEASE ATTACH *ALL RECEIPTS* JUSTIFYING THE ABOVE EXPENDITURES

EMPLOYEE DEVELOPMENT COMMENTS

PNM 1986 11/82

ADMISSION POLICIES AND PROCEDURES

ADMISSIONS POLICY

San Juan College is an independent two year comprehensive community college having as its fundamental mission serving the needs of members of the community seeking continued postsecondary education. In order to fulfill this mission. San Juan College has an open door policy for admission of students who have graduated from an accredited high school. completed a GED certificate. or who. through age and experience. qualify for admission.

ADMISSION TYPES:

1. REGULAR ADMISSION

this is admission as a student seeking a degree or certificate at San Juan College. Admission requires that a transcript of all post-secondary work be sent to San Juan College. If a student has less than 30 semester hours of post-secondary work. a high school or GED transcript must also be sent to San Juan College.

2. PROVISIONAL ADMISSION

this is admission as a student not seeking a degree or certificate at San Juan College. Courses taken may be transferred to another college. taken for job improvement or taken for personal enrichment. No college or high school transcripts are required and a degree or certificate cannot be earned under this type of admission status.

ACADEMIC ELIGIBILITY

Students who have graduated from an accredited high school and have a cumulative grade average of 2.0 or above or who rank in the top 75% of their class or who have completed a GED with a score of 45 or above may be admitted to San Juan College as regular students without condition.

High School graduates with a cumulative grade average below 2.0 or who ranked in the lower 25% of their class or who have GED scores between 40 and 44 may be admitted as a Provisional-Conditional student.

A student who has not graduated from high school or completed a GED program who is at least eighteen years old. and whose high school class has graduated may be admitted as a Provisional-Non-High School student. This student may take courses under provisional admission but cannot receive a degree or certificate without first completing the high school or GED requirement.

ADMISSION PROCEDURES:

RA—REGULAR ADMISSION (First Time Any College)

Any student making application to San Juan College who intends to work toward a degree or certificate from San Juan College should apply for regular admission. All students receiving financial aid or veterans assistance must apply as regular admission students

Requirements for admission as a regular admission student include:

1. *Formal application for admission. accompanied by $10 admission fee.*
2. *Seven or eight semester transcript from an accredited high school or its equivalent GED scores. The transcript is to be sent directly from the high school or testing center to the Admissions Office.*
3. *Graduation from an accredited high school or receipt of GED certificate. The GED certificate must meet New Mexico standards of a score of 40 or above on all subtests or an overall average of 50 or above.*

If a beginning freshman student has a high school cumulative grade point average below 2.0 or cumulative GED score between 40—44 Provisional Conditional status will be granted rather than Regular status.

Certain conditions may arise which justify a waiver of one or more of the requirements. For special cases. contact the Director of Admissions.

RA—REGULAR ADMISSION (Transfer)

Transfer students from other colleges or universities may be accepted if they have at least a 2.0 cumulative grade point average and are eligible to return to the college or university last attended.

Students will be admitted on a Regular-Conditional basis pending receipt and evaluation of transcripts from all prior post-secondary institutions.

Registration for a subsequent semester will be denied if transcripts are not received as required and a student who fails to meet admission requirements by provision of required transcripts will lose credit for any work taken at San Juan College.

No transcript will be evaluated until an application for admission has been received and enrollment has been completed. Transcripts are evaluated, allowable credits determined, and class standing assigned based upon all transcripts received.

Credit may be granted for courses in which a grade of "C" or higher is earned.

It is the responsibility of the student to provide course descriptions from their previous colleges or universities to aid in proper credit evaluation.

San Juan College honors all probation and suspension actions of other colleges and universities. A student on probation at another institution will be placed on probation at San Juan College. A student on suspension at another institution is not admittable to San Juan College during the period of suspension or one year, whichever is longer.

Falsification of any information on the application for admission or other official documents will result in an automatic denial of admission and of credit earned.

READMISSION PROCEDURES:

RA-REGULAR READMISSION

Students who have previously attended San Juan College but have not been enrolled for three semesters or more must apply for readmission.

Students who are admitted as regular degree seeking students will be readmitted as regular. The application for admission form CANNOT be used to change admission type.

Requirements for regular readmission status include:

1. *Formal application for regular readmission. A $10 admission fee is not required.*
2. *If the student has attended any other institution since attending San Juan College, final college transcripts must be sent directly from each of the institutions to the Admissions Office in order to maintain admission status.*
3. *If the student had previously been tentatively admitted, but did not fulfill all admission requirements, the previous deficiencies must be removed prior to the semester for which the student is reapplying.*

Certain conditions may arise which justify a waiver of one or more of the requirements. For special cases, contact the Director of Admissions.

Once a student has met all requirements, an admissions evaluation is prepared. At the time of the evaluation, a determination is made as to the student's admission status: regular (past work at San Juan College was a 2.0 or higher, regardless of recent work at another institution), on probation (past work at San Juan College was below a 2.0 cumulative GPA and the student was placed on probation following the last attendance at San Juan College).

Readmission status is determined by the last attendance at San Juan College regardless of more recent work at another institution.

A student who is under current suspension rulings, either from San Juan College or another institution, cannot be readmitted until the suspension is completed or one year has elapsed.

All requirements must be met prior to a particular semester for which the student is enrolling before a Permit to Enroll will be issued. At the discretion of the Director of Admissions at the time of registration, if a readmission student has not met all the requirements, special permission to enroll on a tentative basis for one semester may be granted. At the end of the semester, if all requirements are not met they will be made Z-types. (Z-types are those whose admission requirements have not been met and whose credit for the semester enrolled is denied.)

CHANGE OF STATUS

A provisional student in good academic standing who meets requirements for regular admission may request to be changed to a regular degree-seeking status.

Requirements for a change of status from provisional to regular include:

1. *Good academic standing at San Juan College with a cumulative GPA of 2.0 or better.*
2. *Formal application on AD-09 CHANGE OF STATUS REQUEST.*
3. *Transcript showing graduation from an accredited high school or GED certificate of completion.*
4. *Final college transcripts sent directly from each of the institutions of higher education which the student has attended or enrolled in.*
5. *Acceptance of the catalog in effect at the time of the change in status regarding requirements for a degree or certificate.*

Once a student has met all requirements, an evaluation is prepared. At the time of the evalution, a determination is made as to the student's admission status and the semester to be admitted in that status. This may be either current or retroactive depending on the effect it will have on the students record. Admission to regular status is based on qualifications at the time of first admission to provisional status.

No more than 30 semester hours may be taken at San Juan College under the Provisional Admission status program for change into a regular admission degree or certificate program at a later date.

REGISTRATION AND RECORDS

REGISTRATION POLICY

San Juan College has an open door policy for admission of students. It is also the policy of San Juan College to offer equal access to courses being offered for all students who have the prerequisites, subject to enrollment limits and deadlines.

REGISTRATION

Registration at San Juan College is computerized and has been designed to allow students to register during registration periods to be scheduled as follows:

CON-Registration (for any continuing student)

Registration during this period is restricted to continuing students in good standing who have met admission requirements.

NEW-Readmitted Student Registration (for any new or readmitted student)

Scheduled to begin after new student orientation, to be held before open registration. New student registration will be open in conjunction with the orientation program.

OPN—Registration (for any student)

Scheduled immediately preceding the beginning of classes.

LAT-Registration (for any student who could not register during the scheduled times)

Scheduled for one week from the first day of classes through the fifth day of classes. A $10 late registration fee applies.

STUDENT CREDIT HOUR LOAD

The normal load for a full-time college student who plans to graduate in two years is 15-17 hours per semester. An overload is more than 18 credit hours per semester. A one credit course in Physical Education may be taken without being included in the calculation for determining overload.

The normal load in summer school is the same number of credits as there are weeks in the session plus one credit hour.

Written permission for the student to register for an overload must be obtained from the Instructional Dean. To be eligible to take an overload, a student must have sophomore standing and must have a cumulative grade point average for the two preceding semesters of 2.5 or better, with no grade less than a 'C'.

No freshman will be permitted to assume an overload unless program design requires enrollment in hours in excess of 18.

A full-time student must enroll in and complete a minimum of 12 semester hours to maintain full-time status for FA-fall or SP-spring semesters and 1 credit hour per week of instruction for SS-summer or IS-Interim Sessions.

CONCURRENT ENROLLMENT

A student who is enrolled at San Juan College may be concurrently enrolled at another college or university under the following conditions:

1. Enrollment at another institution is limited to one course not to exceed 4 semester hours for transfer purposes.
2. The course to be transferred must apply to the student's major area of study.
3. A written request and approval for concurrent enrollment must be made in advance of enrollment.

SCHEDULE CHANGES

Three time periods are scheduled each semester when students can make certain changes in their course schedule. These time periods are:

Schedule Change Period

This period will be scheduled each semester (SP-FA) from the first through the fifth day of class. A $2.00 fee is charged for any schedule change (Limited to one drop and/or one add per card excluding labs or other non-credit courses per card). Changes will only be made using form AD-28 SCHEDULE CHANGE CARD. Phone calls or other written requests will not be accepted. A refund is given, if appropriate, when students drop a course during this period and charges are added when part-time students add courses to their schedule.

AD-28 SCHEDULE CHANGE CARDS are available from the Business Office. The form must be completed, approved and returned to the Admissions and Records Office within the first five days of instruction to be honored.

Drop-Add Period

A drop-add period will be scheduled each semester from the sixth day of class through the sixteenth day prior to the last day of instruction for the semester. No fee is charged to drop a class, to move to another section of the same class or to move to a higher or lower class within the same department. Requests for class additions will not be honored during this period. No refunds will be made for dropping a single course.

A student's transcript will reflect a "W" when a course is dropped after the college census date (Third Friday of instruction).

All requests to drop or add a course during this period must be done on AD-74 COURSE DROP—ADD FORM and must be submitted directly to Admissions and Records.

Student Withdrawal Period

A student may withdraw from all classes during a semester by completing an AD-21 STUDENT WITHDRAWAL CARD. The scheduled period for student withdrawals is from the first day of class and before the fifteenth day prior to the last day of instruction. A "W" is given as a grade for each course from which a student is withdrawn. After the final withdrawal date has passed, a letter grade must be given in each course for which a student is registered.

Refunds for withdrawals will be made according to the following scale:
100 percent—first week of instruction
80 percent—second week of instruction
60 percent—third week of instruction
30 percent—fourth week of instruction
00 percent—beyond fourth week of instruction

All signatures must be complete and all information provided as requested. If the student is due a refund the AD—21 STUDENT WITHDRAWAL FORM will indicate this. The Business Office copy will serve as the official refund authorization document when signed by the Admissions Director.

CREDIT FOR MILITARY SERVICE

Credit for Military service is granted under certain conditions. For more information contact the Admissions and Records Office.

ACADEMIC HONORS

Semester honor lists are published each Fall and Spring. The following criteria apply:

1. **Presidents Honor Roll:**
   - a. *Enrolled in 12 or more credit hours.*
   - b. *Semester grade point average of 3.80 or above.*
2. **Deans Honor Roll:**
   - a. *Enrolled in 12 or more credit hours.*
   - b. *Semester grade point average of 3.50 – 3.79.*

CLASS RANK

Class rank is determined by the number of credit hours the student has earned.

Freshman-less than 30 semester hours of credit earned.
Sophomore-30 or more semester hours of credit earned.

SCHOLASTIC STANDING

Good Standing-*A student whose cumulative grade point average is equal to or greater than 2.0 is in 'good standing'.*

Scholastic Probation-*Students are placed on probation at the end of a semester or summer session when their cumulative grade point average (GPA) falls below 2.0. However, students entering the college in summer are not placed on probation if the cumulative GPA drops below 2.0. Notification to students of scholastic probation or suspension appears on the student's grade report at the end of each grading period.*

Students (admitted under special provisions) whose transcripts indicate less than a 2.0 GPA are entered on condition and on probation.

Probation or suspension status applies to all subsequent enrollments.

Suspension- *Any student appeal of a suspension action must be made in writing to the Registrar for referral to the San Juan College Academic Standards Committee.*

Removal of Scholastic Probation-*Such academic standing is removed when the cumulative GPA is raised to a 2.0 or higher, with the following exceptions:*

1. *A transfer student may not remove probation by summer work alone.*
2. *If an 'I' grade is removed after the student has enrolled, the new grade's effect on academic standing is based on its inclusion with grades for the term for which the student is enrolled.*

Continuing in Probationary Status-*Students may continue to enroll while on probation provided they maintain a semester GPA of 2.0 or higher. They are continued on probation if they withdraw from the college while on probation.*

Restrictions on Enrollment while on Probationary Status-No student on probation may enroll for more than 15 credits during a semester, without permission of the Instructional Dean.

Students on probation receiving educational benefits from the Veterans' Administration must obtain counseling from the Veterans' Affairs Officer.

Scholastic Suspension-*Students enrolled for a semester on probation are suspended when both the semester GPA and cumulative GPA are below 2.0. The first suspension from San Juan College will be for one semester. A student suspended at the end of the fall semester may attend the subsequent summer school if the suspension was for one semester only. The second suspension from San Juan College will be for one calendar year. The third and subsequent suspensions will be for a calendar year. Notification to students of scholastic probation or suspension appears on the student's grade report at the end of each grading period.*

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Effect of Summer Attendance-*Students suspended at the close of the spring semester may have suspension rescinded if they attend one or both of the following summer sessions at San Juan College. Such attendance must raise the combined spring semester and summer GPA to 2.0 or better.*

A certification of eligibility to attend summer sessions at San Juan College after a spring semester suspension is available to the suspended student who wishes to attend summer sessions at other institutions. However, work taken at other institutions has no effect upon the spring semester suspension, nor will it be accepted by San Juan College for transfer credit.

Disciplinary Probation and Suspension-*San Juan College expects all students to regard themselves as responsible citizens on campus and in the community.*

Repeated misconduct and major violations will cause the student to be subject to immediate suspension or expulsion from the college, and all penalties will be doubled in length of time.

The general rules and regulations expected of students are in the STUDENT HANDBOOK available in the Admissions and Records Office.

TRANSCRIPTS

Official and unofficial transcripts are issued from the Office of Admissions and Records.

A charge of $2.00 is made for any official transcript of credits. No transcript of credits will be released if the student is in debt to the college.

Official transcripts including a semester's work are available approximately one week after the issue of final grades for the semester.

Unofficial transcripts may be requested for student pickup the next day. An ID card is required.

No transcripts are issued during registration or final grade processing periods.

GRADUATION PROCEDURES

APPLICATION FOR DEGREE OR CERTIFICATE

Degree or certificate candidates are required to file an application and pay the graduation fee for each degree or certificate sought. Application forms are available from the Office of Admissions and Records. Forms must be completed and fees paid by the dates noted below:

SS—SUMMER SESSION	*JUN 01*
FA—FALL SEMESTER	*NOV 01*
SP—SPRING SEMESTER	*JAN 31*
LATE APPLICATION	*FEB 28*

No applications will be processed after February 28 for the current graduation year.

Fees for graduation including the costs for cap and gown are:

APPLICATION FEE	*$20.00*
LATE FEE (Feb 01-Feb 28)	*$15.00*

TRANSFER STUDENT

San Juan College has a broad policy of acceptance of transfer credits from other post-secondary institutions recognized by regional accrediting agencies. Regardless of the number of credit hours accepted for transfer into San Juan College, a maximum of forty-five (45) may be applied toward a degree or certificate.

A transfer student must complete a maximum of fifteen (15) credit hours at San Juan College prior to the granting of a degree or certificate. A minimum of twelve (12) of the last fifteen (15) credits must be selected from courses offered within the department or major granting the degree or certificate.

DOCUMENTATION

All substitution or waiver requests, course challenges, "I" grade removals and other actions which apply to individual student records must be completed prior to application for the degree or certificate. Failure to do so will result in the application being rated and denied for lack of minimum graduation requirements.

SECOND DEGREES

A student who has earned a degree from a regionally accredited college may be granted a second degree from San Juan College upon completion of the following:

01. General education requirements for the degree sought.

02. A minimum of 15 hours on campus with 12 of these hours in a major area of study.

03. Completion of specific education requirements for the degree sought.

A student who has earned a degree from San Juan College may earn a second and subsequent degree upon the satisfactory completion of:

01. Requirements for the degree as specified in the catalog if the degree is not the same as already earned.

02. Twenty semester hours beyond the last degree received with all hours completed on campus and within the department or major granting the degree for same degrees.

03. Credit by examination, course challenge, S/U option, independent study or work completed prior to the granting of a degree are not acceptable toward the required twenty (20) credits.

EVALUATION

When the application is received, an evaluation will be completed by the Admissions-Records staff for concurrence by the Division Chairperson.

Only documentation on file in the students' record folder and current registration records will be used in this evaluation. The student will be notified in writing of the outcome of this evaluation.

ATTENDANCE AT COMMENCEMENT

The registrar certifies eligibility to participate in commencement exercises held at the close of the spring semester. Eligible candidates for the spring semester and degree or certificate recipients from the previous summer and fall semesters may participate in the ceremony.

ISSUE OF DEGREE OR CERTIFICATE

Certification of final approval for a degree or certificate will be placed on the student's Official Record at the end of the semester when all requirements have been completed and final grades certified.

Actual degree and certificate documents are sent by registered mail to students after the annual graduation ceremonies when all final grades are certified and all financial records are cleared.

DEFINITIONS

ELECTIVE:

An "elective" is a course not required for graduation or for the fulfillment of requirements for a major. To assist in choosing electives, a student should consult his counselor and the catalog of the college to which he expects to transfer.

PREREQUISITE:

A "prerequisite" is a course which must be completed before enrollment in certain courses. For example, Spanish I is a prerequisite for Spanish II and must be completed before enrolling in Spanish II. Prerequisites are listed in the description of courses in the catalog.

CERTIFICATE:

Certain courses of study may result in the award of a certification of completion. Normally 30-36 credit hours of study are required. This may be completed in two to three semesters. In some cases a second year may be included and a summer session.

ASSOCIATE DEGREES:

A degree awarded for completion of a prescribed program of study, usually of two years' duration and a minimum of 62 semester hours.

SJ San Juan
CO College

APPLICATION FOR ADMISSION

SOCIAL SECURITY NUMBER

•PLEASE PRINT ALL INFORMATION•

EDUCATIONAL PLANS

APPLICATION FOR ADMISSION OR READMISSION

☐ADMISSION
- ☐REGULAR
- ☐PROVISIONAL

☐READMISSION
- ☐REGULAR
- ☐PROVISIONAL

ENROLLMENT STATUS (Check One)

1 ☐ New Student (First college attended)
2 ☐ New Transfer from In-State
3 ☐ New Transfer from Out of State
4 ☐ Readmission Transfer (Attended another college since leaving SJC)
5 ☐ Readmission (Attended SJC previously)
6 ☐ Early Admission
6 ☐ High School Class of 19_____

PLANNING TO ENROLL

☐ FA-19____ ☐ SP-19____ ☐ SS-19____ ☐ CURRENTLY ENROLLED

PLANNING TO WORK TOWARD

☐ D-DEGREE ☐C-CERTIFICATE ☐N-NEITHER

PRIOR AREA VOCATIONAL STUDENT

☐YES ☐NO

READMISSION - LAST ATTENDED SJC

☐ FA-19____ ☐ SP-19____ ☐ SS-19____

PERSONAL INFORMATION

LAST NAME

FIRST NAME **MIDDLE**

MAILING ADDRESS

CITY **STATE**

ZIP CODE **AREA CODE-PHONE** ( )

DATE OF BIRTH Mo Day Yr **STATE OF BIRTH**

SEX ☐M ☐F

MAIDEN OR OTHER NAMES USED

DATA ENTERED

IN CASE OF EMERGENCY

IN CASE OF EMERGENCY - NOTIFY - NAME **MAILING ADDRESS**

CITY - STATE - ZIP CODE **AREA CODE-PHONE** ( ) **RELATIONSHIP**

EDUCATION BACKGROUND

NAME OF HIGH SCHOOL LAST ATTENDED	LOCATION - CITY & STATE	GRADUATE	MO.-YR.
		☐YES ☐NO	

IF NOT A HIGH SCHOOL GRADUATE, DID YOU EARN A GED CERTIFICATE? ☐YES

NAME OF COLLEGE AND VOCATIONAL-TECHNICAL SCHOOLS PREVIOUSLY ATTENDED (LIST MOST RECENT ONE FIRST)	LOCATION-CITY & STATE	GRADUATE	YEARS OF ATTENDANCE
		☐YES ☐NO	19-
		☐YES ☐NO	19-
		☐YES ☐NO	19-
		☐YES ☐NO	19-

IF YES, WHAT STATE

IF YES, WHAT YEAR

☐AD-12 ☐ AD-12b

ARE YOU ELIGIBLE TO RETURN TO THE LAST COLLEGE OR UNIVERSITY ATTENDED? ☐YES ☐NO

PARENT-GUARDIAN INFORMATION

PARENT INFORMATION REQUIRED IF APPLICANT IS UNDER 18 YEARS OF AGE

FATHER - NAME

ADDRESS

MOTHER - NAME

ADDRESS

RESIDENCY STATUS

U.S. CITIZEN ☐YES ☐NO

IF NOT CITIZEN, GIVE VISA TYPE

COUNTRY

STATE OF LEGAL RESIDENCE

IF NEW MEXICO INDICATE COUNTY

Length of time, preceding date of this application that applicant has resided continuously in New Mexico YRS MO

Were you reported as a dependent on a parent or guardian's Federal Income Tax report for last year? ☐YES ☐ NO

☐R
☐AD-87
☐AD-87c
☐AD-87d
☐N
☐C
☐AD-80

AD-02

OTHER PERSONAL DATA

NOTICE

This information is collected for statistical purposes ONLY and is not used in the determination of eligibility for admission to San Juan College or any of its programs.

ETHNIC BACKGROUND (VOLUNTARY)

AI ☐ American Indian/Alaskan Native
AO ☐ Asian American/Pacific Islander
AB ☐ Black/Non-Hispanic
AS ☐ Hispanic
OT ☐ White/Non-Hispanic

VETERAN STATUS

VT ☐ Veteran
NV ☐ Non-Veteran

ADMISSION FEE

A one time, non-refundable admission fee of $10.00 is required with this application for admission. No fee is charged for readmission.

MAIL APPLICATION AND FEE TO:

Office of Admissions
San Juan College
4601 College Blvd.
Farmington, New Mexico 87401

MAJOR AREA OF PLANNED STUDY

MAJOR AREA OF STUDY (INDICATE ONLY ONE)

ASSOCIATE OF ARTS

A-ANTH	☐ ANTHROPOLOGY
A-ARTS	☐ FINE ARTS (MUSIC, DRAMA, DANCE)
A-CHEM	☐ CHEMISTRY
A-COME	☐ COMMUNICATIONS-MEDIA
A-ECON	☐ ECONOMICS
A-EDUC	☐ EDUCATION
A-ENGL	☐ ENGLISH
A-GEOL	☐ GEOLOGY
A-GOVT	☐ GOVERNMENT
A-HIST	☐ HISTORY
A-PHED	☐ PHYSICAL EDUCATION
A-PHIL	☐ PHILOSOPHY
A-PLSC	☐ POLICE SCIENCE
A-SOCI	☐ SOCIOLOGY
A-SPCH	☐ SPEECH

ASSOCIATE OF SCIENCE

A-BIOL	☐ BIOLOGICAL SCIENCES
V-COSC	☐ COMPUTER SCIENCE
A-ENGR	☐ ENGINEERING
A-MATH	☐ MATHEMATICS
A-PMED	☐ PREMEDICAL SCIENCES

ASSOCIATE DEGREE IN NURSING

V-NURS	☐ NURSING (RN)

ASSOCIATE OF APPLIED SCIENCES

V-ACCT	☐ ACCOUNTING
V-AUBO	☐ AUTO BODY
V-AUME	☐ AUTOMOTIVE TECHNOLOGY
V-BANK	☐ BANKING
V-BADM	☐ BUSINESS/MANAGEMENT
V-DATA	☐ DATA PROCESSING
V-DRFT	☐ DRAFTING/DESIGN TECHNOLOGY
V-INEL	☐ INDUSTRIAL ELECTRICITY/ELECTRONICS
V-INST	☐ INSTRUMENTATION
V-MASH	☐ MACHINE SHOP
V-REES	☐ REAL ESTATE
V-SEAD	☐ SECRETARIAL ADMINISTRATION
V-SEAD	☐ WORD PROCESSING
V-WELD	☐ WELDING

CERTIFICATE

V-AUBO	☐ AUTO BODY
V-AUME	☐ AUTOMOTIVE TECHNOLOGY
V-BADM	☐ BASIC BUSINESS
V-CARP	☐ CARPENTRY
V-DATA	☐ COMPUTER OPERATOR
V-DATA	☐ PROGRAMMER
V-DIME	☐ CONSTRUCTION EQUIPMENT
V-DIME	☐ DIESEL/HEAVY DUTY MECHANICS
V-MASH	☐ MACHINE SHOP
V-NURS	☐ NURSING (RN)
V-PLUM	☐ PLUMBING
V-SEAD	☐ SECRETARIAL/CLERICAL
V-SEAD'	☐ SECRETARIAL
V-WELD	☐ WELDING/METAL FABRICATION
	☐ OTHER/NON-DEGREE SEEKING

EMPLOYER BASED PROGRAMS

V- ____________________

STUDENT CERTIFICATION

I understand that withholding information requested in this application, failure to submit all required documents, or giving false information may make me ineligible for admission to, or continuation at, San Juan College. I, therefore, certify that all of the above statements are correct and complete.

Date ____________________ Signature of Applicant ____________________

NONDISCRIMINATION POLICY

It is the policy of San Juan College not to discriminate on the basis of sex, handicap, race, color, religion, or national or ethnic origin in its admission policies, educational programs, employment policies, financial aid, or other school administered programs. This policy is enforced by federal law under Title IX of the Education Amendments of 1972, Title VI of the Civil Rights Act of 1964, and Section 504 of the Rehabilitation Act of 1973.

DO NOT WRITE BELOW THIS LINE

DO NOT WRITE IN THIS SPACE

STUDENT CLASSIFICATION
PR ☐ PROVISIONAL
FR ☐ FRESHMAN
TR ☐ TRANSFER ☐ AC
☐ VO
☐ NE

MAJOR CODE ☐ ____________________

ADVISOR CODE ☐ ____________________

☐ PA NO-14 ☐ RA NO-30

☐ FL-86 TEMP. PERMIT ISSUED

APPLICATION FEE PAID

☐ Cash ☐ AD-27 ☐ Read
☐ Check ☐ AD116 ☐ AD-73

APPLICATION ACCEPTED BY:	**DATE**
APPLICATION CLEARED BY:	**DATE**

DATA ENTERED

AD-02b

PUBLIC SERVICE COMPANY OF NEW MEXICO
SAN JUAN
OJT CHECKLIST (DAY & HOURS)

NAME

MONTH YEAR

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

FOREMAN

APPRENTICE

DISTRIBUTION WHITE-INSTRUCTOR YELLOW-APPRENTICE

PNM 4649 5/83

APPENDIX 4

APPENDIX 5

SJ San Juan
C College

4601 COLLEGE BOULEVARD•FARMINGTON, NEW MEXICO 87401•505-326-3311

June 12, 1985

Mr. Denver Bearden
Training Supervisor
Public Service Company of New Mexico
P.O. Box 227
Waterflow, New Mexico 87421

Dear Denver:

Subject: Policies and Procedures for Co-op Program

Please review the following items and advise if you feel that they are appropriate and feasible:

1. Completed applications for admission to San Juan College of new apprentices/journeymen will be turned in immediately to Judy Hernandez. Any necessary high school or college transcripts must be forwarded to San Juan College and is the responsibility of each new apprentice. Judy will forward the application to the Co-op Director who will submit it to the San Juan College Admissions Office. The apprentice will then be enrolled in the appropriate first year courses.

2. Grades and course enrollments will be submitted to San Juan College Student Services three times per year (July, November and April).

3. Grade control sheets will have the signature of the PNM instructor and the San Juan College Co-op Director.

4. Grades submitted by PNM instructors are permanent and will not be subject to change.

5. Previous "S" grades submitted for co-op courses are to remain on the transcripts.

6. Instructors may utilize their own system of evaluating and assessing grades for the co-op courses. Consistency must be maintained within the grading system and each apprentice/journeyman's grade derived using the same formula, technique, etc.

7. Each quarter, students who have reached an anniversary date in that quarter will be reviewed for grading purposes and documentation for on-the-job training. The PNM instructor, San Juan College Co-op Director, and the student will meet. The student's four quarters of on-the-job training will be verified and a new training agreement signed. Final grades will be recorded for the student's daily work and plant questions, and the student enrolled in the next year's courses.

8. A list of apprentices/journeymen interested in earning an A.A.S. degree should be submitted to the San Juan College Co-op Director so that an appropriate degree check can be done.

9. The San Juan College Co-op Director will maintain the following office hours at PNM:
   Wednesday - 9:00 A.M. to 4:30 P.M.
   Thursday - 9:00 A.M. to 2:00 P.M.
   The Director will be available at other times by appointment.

Sincerely,

Michael B. Styer

Michael B. Styer
Director, Cooperative Education

MBS/db

c: Bob Huddleston

AD-20 INFORMATION - PROCEDURES

APPENDIX 6

INF119 (01)

OPEN ENTRY-OPEN EXIT PROGRAMS - EXTENDED COURSES

12-12-84

San Juan College offers selected programs and courses under the open entry-open exit program referred to as the EC-Extended Course program. Any course which may extend beyond the last day of instruction for any specific semester or which is offered on an open entry-open exit basis will be registered and graded under the following outline procedures:

01. All courses, including EC-Extended Courses, will be established following procedures provided within Admissions-Records guidelines and as provided on form AD-71b COURSE SCHEDULE-INITIAL SEMESTER SCHEDULE.

    The initial extended course offerings for the program may be increased at any time using form AD-72 COURSE SCHEDULE-CHANGE. All courses must be submitted at least five (5) working days prior to student registration for the course.

02. Courses will be carried continuously in an enrollment file separate from the RP-Regular Program semester course file. Courses will be controlled by section number as E1, E2, etc. It is not necessary to submit course forms each semester. A course which is no longer to be offered for open entry open exit should be deleted from the file using AD-72 COURSE SCHEDULE-CHANGE.

03. Extended length courses shall not exceed one year and the balance of one semester less fifteen (15) days in length. Any student registered for extended length credit must complete course work and be graded not later than the sixteenth day before the last instructional day of the semester one year after initial enrollment in the course. No extensions of the instructional time allowed can be made beyond this limit.

04. All student enrollments will be deleted from the continuous enrollment file after the sixteenth day of the semester one year later or when final grade forms are submitted whichever comes sooner. A student who does not complete required course work within specified time limits will receive a grade of "E", a grade which cannot be changed by course completion.

05. Enrollment in extended length courses may be submitted to the Admissions-Records Office at any time during the semester excluding the period fifteen (15) days prior to the last day of instruction for the semester.

    Registrations received during the first fifteen (15) days of instruction (prior to Census Day) will be held. Registrations will only be processed between the period fifteen (15) days after instruction begins up to fifteen (15) days before instruction ends for any semester.

06. A student who elects to enroll under the extended course program must follow admission procedures similiar to regular program students. Any student applying for Regular Admission who does not meet admission requirements by the end of the semester of initial enrollment will be changed to Provisional Admission at the end of the semester of initial enrollment. Under this provision, a student may continue enrollment in subsequent semesters but cannot earn a degree or certificate.

07. A student enrolls in an extended course by first contacting the Division Head or designated representative. Space availability is determined and enrollment authorized on form AD-27E COURSE ENROLLMENT AUTHORIZATION-EXTENDED COURSES. Also determined at this time is the meeting time, dates, beginning date and projected ending date for course work completion. This date will always be Friday of the week during which work is to terminate. When completed, the student must present the enrollment authorization form to the Admissions-Records Office for processing and payment. Admission documents will be completed at this time and cleared for enrollment. A copy of the enrollment authorization will be returned to the instructor as verification that enrollment has been completed and payment made. A student should NOT be allowed to enter the class until this verification if received

08. Payment must be made at the time of enrollment. No deferred payments or registration without payment will be processed. Course tuition at the published rates will be charged for each hour of extended length course enrollment without provision for fulltime enrollment and maximum tuition cut-off at twelve (12) credit hours.

09. Extended courses are offered as a special service to students in selected courses. This program is NOT designed for the full-time student or for any student on financial aid of any type. EC-Extended Courses are not counted as part of the credit hours applicable towards determination of full-time or part-time enrollment. No eligibile student, however, is excluded from enrollment in extended length courses.

10. Enrollment in extended courses will not be reflected on ENROLLMENT VERIFICATION forms or other enrollment documents mailed to or requested by the student

11. Enrollment in extended courses will be entered and graded into the RP-REGULAR PROGRAM semester file during the semester in which course work is completed and the final grade submitted to the Admissions-Records Office. Enrollment and FTSE counts will be added onto the semester Census Records published at the end of the semester. These FTSE figures will be credited to the Division responsible for the course. No FTSE will be credited to any specific instructor since there may be no continuity between the instructor responsible for initial enrollment and the instructor responsible for work completion up to a year later.

12. Final grades for extended length courses will be submitted individually on form AD137 EXTENDED LENGTH COURSE (E) GRADE SHEET. Final grades are due not later than NOON-MONDAY of the week after the final week of instruction. Individual grade due notification will be provided to the Division Head on Monday of the week grades instruction ends using form AD167 DIVISION NOTIFICATION - FINAL GRADES DUE.

13. The length of the pre-determined instructional period may be extended not more than one time when the student presents justifiable cause. This extension must be authorized on form AD168 COURSE ENROLLMENT EXTENSION AUTHORIZATION prior to Monday of the ending week of instruction and cannot exceed a period of two weeks or the sixteenth day before the last

instructional day of the semester one year after initial enrollment in the course, whichever is shorter.

14. A student may withdraw from an extended course following procedures established for regular program classes through Friday before the last week of instruction as pre-determined for the individual student. No refund is made of tuition paid after Friday of the week of initial enrollment. No grade record is maintained for withdrawal prior to Friday of the first week of instruction.

    The student's transcript will carry a grade of "W" for withdrawal after Friday of the first week of instruction.

15. A student who finishes a course prior to the pre-determined ending date may be graded by completion of form AD168 COURSE ENROLLMENT EXTENSION AUTHORIZATION indicating that the ending date is being moved backward, thus generating a call for the final grade report.

16. EC-Extended Courses and RP-Regular Program courses are maintained as two separate programs at San Juan College. For this reason, a student may NOT change sections of courses between the EC-Extended Course program and RP-Regular Program classes.

17. Enrollment of students in special programs including the Police, PNM, APS and other group type programs, may be handled through program coordinators at San Juan College. These students do not have to obtain instructor approval since enrollment is determined by the program and coordinator. A projected ending date must be specified for these students however.

APPENDIX 7

STUDENT NAME____________________
SOCIAL SECURITY #________________
ANNIVERSARY DATE________________

DATE STARTED____________________
DATE ENDED______________________

INDUSTRIAL INSTRUMENTATION (ININ)

Prerequisites: MATH 135 3 CR ☐ PHYS 111 4 CR ☐

1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
☐ ET 140 4 CR Date Signature	☐ INST 272 3 CR Date Signature	☐ INST 220 4 CR Date Signature	☐ ET 278 4 CR Date Signature
☐ ET 160 4 CR Date Signature	☐ ET 180 4 CR Date Signature	☐ INST 260 4 CR Date Signature	☐ INST 270 4 CR Date Signature

COOPERATIVE EDUCATION

☐ ININ 280 4 CR Date Signature	☐ ININ 282 4 CR Date Signature	☐ ININ 284 4 CR Date Signature	☐ ININ 286 4 CR Date Signature

POWER PLANT OPERATIONS

☐ ININ 270 1 CR Date Signature	☐ ININ 272 2 CR Date Signature	☐ ININ 274 2 CR Date Signature	☐ ININ 276 2 CR Date Signature

GENERAL EDUCATION

☐ ENGL 111 3 CR Date Signature	☐ SPEECH 110 3 CR Date Signature -OR-	☐ HUMANITIES 3 CR Date Signature
☐ ENGL 218 3 CR Date Signature	☐ SPEECH 111 3 CR Date Signature	

COMMENTS:____

GPA__________

STUDENT NAME____________________
SOCIAL SECURITY #____________________
ANNIVERSARY DATE____________________
DATE STARTED____________________
DATE ENDED____________________

INDUSTRIAL MECHANICS (INME)

1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
☐ INME 110 5 Cr	☐ INME 180 4 Cr	☐ INME 210 4 Cr	☐ INME 260 5 Cr
Date Signature	Date Signature	Date Signature	Date Signature
☐ WELD 120 * 3 Cr	☐ WELD 123 * 2 Cr		
Date Signature	Date Signature		

COOPERATIVE EDUCATION

☐ INME 280 4 Cr	☐ INME 282 4 Cr	☐ INME 284 4 Cr	☐ INME 286 4 Cr
Date Signature	Date Signature	Date Signature	Date Signature

POWER PLANT OVERVIEW

☐ INME 270 1 Cr	☐ INME 272 2 Cr	☐ INME 274 2 Cr	☐ INME 276 2 Cr
Date Signature	Date Signature	Date Signature	Date Signature

GENERAL EDUCATION

☐ ENGL 111 3 Cr	☐ SPEECH 110 3 Cr	☐ MATH 113 3 Cr	☐ HUMANITIES 3 Cr
Date Signature	Date Signature -OR-	Date Signature -OR-	Date Signature
☐ ENGL 218 3 Cr	☐ SPEECH 111 3 Cr	☐ MATH Higher than 113	☐ ELECTIVE 3 Cr
Date Signature	Date Signature	Date Signature	Date Signature

COMMENTS:____________________ GPA__________

*OR JOURNEYMAN WELDING *OR JOURNEYMAN WELDING

STUDENT NAME______________________________
SOCIAL SECURITY #__________________________
ANNIVERSARY DATE__________________________
DATE STARTED______________________________
DATE ENDED_______________________________

INDUSTRIAL WATER TREATMENT PROGRAM (FUEL)

1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
☐ FUEL 110 5 Cr	☐ FUEL 180 5 Cr	☐ FUEL 210 5 Cr	☐ FUEL 260 5 Cr
Date Signature	Date Signature	Date Signature	Date Signature

COOPERATIVE EDUCATION

☐ FUEL 280 4 Cr	☐ FUEL 282 4 Cr	☐ FUEL 284 4 Cr	☐ FUEL 286 4 Cr
Date Signature	Date Signature	Date Signature	Date Signature

POWER PLANT OVERVIEW

☐ FUEL 270 1 Cr	☐ FUEL 272 2 Cr	☐ FUEL 274 2 Cr	☐ FUEL 276 2 Cr
Date Signature	Date Signature	Date Signature	Date Signature

GENERAL EDUCATION

☐ ENGL 111 3 Cr	☐ SPEECH 110 3 Cr	☐ MATH 113 3 Cr	☐ HUMANITIES 3 Cr
Date Signature	Date Signature	Date Signature	Date Signature
	-OR-	-OR-	
☐ ENGL 218 3 Cr	☐ SPEECH 111 3 Cr	☐ MATH Higher than 113	☐ ELECTIVE 4 Cr
Date Signature	Date Signature	Date Signature	Date Signature

COMMENTS:____

GPA_______________

STUDENT NAME ____________________
SOCIAL SECURITY # ____________________
ANNIVERSARY DATE ____________________
DATE STARTED ____________________
DATE ENDED ____________________

INDUSTRIAL WASTEWATER PROGRAM (WAST)

1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
☐ WAST 110 5 Cr Date Signature	☐ WAST 180 5 Cr Date Signature	☐ WAST 210 5 Cr Date Signature	☐ WAST 260 5 Cr Date Signature

COOPERATIVE EDUCATION

☐ WAST 280 4 Cr Date Signature	☐ WAST 282 4 Cr Date Signature	☐ WAST 284 4 Cr Date Signature	☐ WAST 286 4 Cr Date Signature

POWER PLANT OVERVIEW

☐ WAST 270 1 Cr Date Signature	☐ WAST 272 2 Cr Date Signature	☐ WAST 274 2 Cr Date Signature	☐ WAST 276 2 Cr Date Signature

GENERAL EDUCATION

☐ ENGL 111 3 Cr Date Signature	☐ SPEECH 110 3 Cr Date Signature	☐ MATH 113 3 Cr Date Signature	☐ HUMANITIES 3 Cr Date Signature
	-OR-	-OR-	
☐ ENGL 218 3 Cr Date Signature	☐ SPEECH 111 3 Cr Date Signature	☐ MATH Higher than 113 Date Signature	☐ ELECTIVE 4 Cr Date Signature

COMMENTS: ____________________

GPA ____________

STUDENT NAME____________________
SOCIAL SECURITY #____________________
ANNIVERSARY DATE____________________
DATE STARTED____________________
DATE ENDED____________________

ELECTRICAL PROGRAM (INEL)

1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
☐ ELEC 110 5 Cr	☐ ELEC 180 5 Cr	☐ ELEC 210 5 Cr	☐ ELEC 260 5 Cr
Date Signature	Date Signature	Date Signature	Date Signature

COOPERATIVE EDUCATION

☐ ELEC 280 4 Cr	☐ ELEC 282 4 Cr	☐ ELEC 284 4 Cr	☐ ELEC 286 4 Cr
Date Signature	Date Signature	Date Signature	Date Signature

POWER PLANT OVERVIEW

☐ ELEC 270 1 Cr	☐ ELEC 272 2 Cr	☐ ELEC 274 2 Cr	☐ ELEC 276 2 Cr
Date Signature	Date Signature	Date Signature	Date Signature

GENERAL EDUCATION

☐ ENGL 111 3 Cr	☐ SPEECH 110 3 Cr	☐ MATH 113 3 Cr	☐ HUMANITIES 3 Cr
Date Signature	Date Signature	Date Signature	Date Signature
___	-OR-	-OR-	
☐ ENGL 218 3 Cr	☐ SPEECH 111 3 Cr	☐ MATH Higher than 113	☐ ELECTIVE 5 Cr
Date Signature	Date Signature	Date Signature	Date Signature

GPA____________

COMMENTS:____
____
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____
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STUDENT NAME________________________
SOCIAL SECURITY #____________________
ANNIVERSARY DATE_____________________
DATE STARTED_________________________
DATE ENDED__________________________

CHEMICAL PLANT OPERATIONS (CHPL)

1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
☐ CHPL 110 5 Cr Date Signature	☐ CHPL 180 5 Cr Date Signature	☐ CHPL 210 5 Cr Date Signature	☐ CHPL 260 5 Cr Date Signature

COOPERATIVE EDUCATION

☐ CHPL 280 4 Cr Date Signature	☐ CHPL 282 4 Cr Date Signature	☐ CHPL 284 4 Cr Date Signature	☐ CHPL 286 4 Cr Date Signature

POWER PLANT OVERVIEW

☐ CHPL 270 1 Cr Date Signature	☐ CHPL 272 2 Cr Date Signature	☐ CHPL 274 2 Cr Date Signature	☐ CHPL 276 2 Cr Date Signature

GENERAL EDUCATION

☐ ENGL 111 3 Cr Date Signature	☐ SPEECH 110 3 Cr Date Signature	☐ MATH 113 3 Cr Date Signature	☐ HUMANITIES 3 Cr Date Signature
	-OR-	-OR-	
☐ ENGL 218 3 Cr Date Signature	☐ SPEECH 111 3 Cr Date Signature	☐ MATH Higher than 113 Date Signature	☐ ELECTIVE 4 Cr Date Signature

COMMENTS:____________________________________

GPA__________

STUDENT NAME ____________________
SOCIAL SECURITY # ____________________
ANNIVERSARY DATE ____________________
DATE STARTED ____________________
DATE ENDED ____________________

SCRUBBER OPERATIONS (SCOP)

1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
☐ SCOP 110 5 Cr	☐ SCOP 180 5 Cr	☐ SCOP 210 5 Cr	☐ SCOP 260 5 Cr
Date Signature	Date Signature	Date Signature	Date Signature

COOPERATIVE EDUCATION

☐ SCOP 280 4 Cr	☐ SCOP 282 4 Cr	☐ SCOP 284 4 Cr	☐ SCOP 286 4 Cr
Date Signature	Date Signature	Date Signature	Date Signature

POWER PLANT OVERVIEW

☐ SCOP 270 1 Cr	☐ SCOP 272 2 Cr	☐ SCOP 274 2 Cr	☐ SCOP 276 2 Cr
Date Signature	Date Signature	Date Signature	Date Signature

GENERAL EDUCATION

☐ ENGL 111 3 Cr	☐ SPEECH 110 3 Cr	☐ MATH 113 3 Cr	☐ HUMANITIES 3 Cr
Date Signature	Date Signature	Date Signature	Date Signature
	-OR-	-OR-	
☐ ENGL 218 3 Cr	☐ SPEECH 111 3 Cr	☐ MATH Higher than 113	☐ ELECTIVE 4 Cr
Date Signature	Date Signature	Date Signature	Date Signature

COMMENTS: ____________________

GPA ____________

STUDENT NAME ______________________________
SOCIAL SECURITY # __________________________
ANNIVERSARY DATE __________________________
DATE STARTED ______________________________
DATE ENDED ________________________________

POWER PLANT OPERATIONS (POPL)

1st YEAR	2nd YEAR	3rd YEAR	4th YEAR
☐ POPL 110 6 Cr	☐ POPL 180 6 Cr	☐ POPL 210 6 Cr	☐ POPL 260 3 Cr
Date Signature	Date Signature	Date Signature	Date Signature

COOPERATIVE EDUCATION

☐ POPL 280 4 Cr	☐ POPL 282 4 Cr	☐ POPL 284 4 Cr	☐ POPL 286 4 Cr
Date Signature	Date Signature	Date Signature	Date Signature

POWER PLANT OVERVIEW

☐ POPL 270 1 Cr	☐ POPL 272 2 Cr	☐ POPL 274 2 Cr	☐ POPL 276 2 Cr
Date Signature	Date Signature	Date Signature	Date Signature

GENERAL EDUCATION

☐ ENGL 111 3 Cr	☐ SPEECH 110 3 Cr	☐ MATH 113 3 Cr	☐ HUMANITIES 3 Cr
Date Signature	Date Signature	Date Signature	Date Signature
	-OR-	-OR-	
☐ ENGL 218 3 Cr	☐ SPEECH 111 3 Cr	☐ MATH Higher than 113	☐ ELECTIVE 3 Cr
Date Signature	Date Signature	Date Signature	Date Signature

COMMENTS: ____

GPA ____________

Electrical

Time	Course		Prerequiste
Fall	ET 140 - Applied Basic Electronics	(4)	MATH 135 PHYS 111
Spring	INEL 145 - Applied Basic Reactive Circuits	(4)	ET 140
Fall	INEL 220 - Basic Control Circuits	(4)	INEL 145
Spring	ET 160 - Electronic Circuits I	(4)	ET 140
Fall	INST 272 - Electronic Circuits II	(3)	ET 160
Spring	INEL 225 - Advanced Control Circuits	(4)	INEL 220

For Associate of Applied Science Degree

Courses as listed above	23 Credits
Cooperative Education	16 Credits
ET 278 - Digital Electronics	4 Credits
ET 180 - Principles of Industrial Measurement	4 Credits
*General Education Courses	15 Credits
	62 Credits

*See San Juan College catalog for requirements.

Instrumentation

Time	Course	Prerequiste
Fall	ET 140 - Applied Basic Electronics (4)	MATH 135 PHYS 111
Spring	ET 180 - Principles of Industrial (4) Measurement	ET 140
Fall	INST 220 - Principles of Pneumatic (4) Control Systems	ET 180
Spring	ET 160 - Electronic Circuits (4)	ET 140
Fall	INST 272 - Electronic Circuits II (3)	ET 160
Spring	INST 260 - Advanced Control (4) Circuits	INST 220

For Associate of Applied Science Degree

Courses listed above	23 Credits
Cooperative Education	16 Credits
ET 278 Digital Electronics	4 Credits
INST 270 Robotics	4 Credits
*General Education courses	15 Credits
	62 Credits

*See San Juan College catalog for requirements.

Machine Shop

Time	Course	
Fall	WELD 111 - Basic Welding for T & I	(2)
	MASH 115 - Machine Shop Blueprinting Reading	(3)
Spring skip	MASH 120 - Lathe Operations & Setups	(6)
Fall	MASH 125 - Drill Press, Band Saw, Bench & Layout Operations	(6)
Spring	MASH 130 - Milling Machine Operations & Setups	(6)
Fall	MASH 136 - Grinding Machine Operation & Setup	(6)
Spring	MASH 215 - Advanced Drill Press, Ban Saw, Bench and Layout Operations	(6)

For Associate of Applied Science Degree

Courses as listed above	35 Credits
Cooperative Education	16 Credits
*General Education Courses	15 Credits
	66 Credits

*See San Juan College catalog for requirements.

APPENDIX 9

ARIZONA PUBLIC SERVICE

STUDENT NAME ____________________

SOCIAL SECURITY # ____________________

ANNIVERSARY DATE ____________________

DATE STARTED ____________________

DATE ENDED ____________________

ELECTRICAL (INEL)

1st YEAR	2nd YEAR	3rd YEAR
☐ ET 140 4 CR Enrolled Graded	☐ INEL 220 4 CR Enrolled Graded	☐ INST 272 3 CR Enrolled Graded
☐ INEL 145 4 CR Enrolled Graded	☐ ET 160 4 CR Enrolled Graded	☐ INEL 225 4 CR Enrolled Graded
	COOPERATIVE EDUCATION	
☐ INEL 281 6 CR Enrolled Graded	☐ INEL 282 5 CR Enrolled Graded	☐ INEL 283 5 CR Enrolled Graded
	FOR A.A.S. DEGREE	
☐ ET 278 4 CR Enrolled Graded	☐ ET 180 4 CR Enrolled Graded	☐ SPEECH 110 3 CR Enrolled Graded -OR-
☐ ENGL 111 3 CR Enrolled Graded	☐ ENGL 218 3 CR Enrolled Graded	☐ SPEECH 111 3 CR Enrolled Graded
☐ HUMANITIES 3 CR Enrolled Graded		

COMMENTS: ____________________

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GPA ____________________

ARIZONA PUBLIC SERVICE

STUDENT NAME ____________________
SOCIAL SECURITY # ____________________
ANNIVERSARY DATE ____________________
DATE STARTED ____________________
DATE ENDED ____________________

INSTRUMENTATION (INST)

1st YEAR	2nd YEAR	3rd YEAR
☐ ET 140 4 CR	☐ INST 220 4 CR	☐ INST 272 3 CR
Enrolled Graded	Enrolled Graded	Enrolled Graded
☐ ET 180 4 CR	☐ ET 160 4 CR	☐ INST 260 4 CR
Enrolled Graded	Enrolled Graded	Enrolled Graded

COOPERATIVE EDUCATION

☐ INST 281 6 CR	☐ INST 282 5 CR	☐ INST 283 5 CR
Enrolled Graded	Enrolled Graded	Enrolled Graded

FOR A.A.S. DEGREE

☐ ET 278 4 CR	☐ INST 270 4 CR	☐ SPEECH 110 3 CR
Enrolled Graded	Enrolled Graded	Enrolled Graded -OR-
☐ ENGL 111 3 CR	☐ ENGL 218 3 CR	☐ SPEECH 111 3 CR
Enrolled Graded	Enrolled Graded	Enrolled Graded
☐ HUMANITIES 3 CR		
Enrolled Graded		

COMMENTS: ____________________

GPA ____________________

ARIZONA PUBLIC SERVICE

STUDENT NAME______________________________

SOCIAL SECURITY #__________________________

ANNIVERSARY DATE __________________________

DATE STARTED____________________

DATE ENDED______________________

MACHINE SHOP (MASH)

1st YEAR	2nd YEAR	3rd YEAR
☐ WELD 111 2 CR Enrolled Graded	☐ MASH 125 6 CR Enrolled Graded	☐ MASH 136 6 CR Enrolled Graded
☐ MASH 115 3 CR Enrolled Graded	☐ MASH 130 6 CR Enrolled Graded	☐ MASH 215 6 CR Enrolled Graded
☐ MASH 120 6 CR Enrolled Graded		

COOPERATIVE EDUCATION

☐ MASH 281 6 CR Enrolled Graded	☐ MASH 282 5 CR Enrolled Graded	☐ MASH 283 5 CR Enrolled Graded

FOR A.A.S. DEGREE

☐ ENGL 111 3 CR Enrolled Graded	☐ SPEECH 110 3 CR Enrolled Graded -OR-	☐ HUMANITIES 3 CR Enrolled Graded
☐ ENGL 218 3 CR Enrolled Graded	☐ SPEECH 111 3 CR Enrolled Graded	

COMMENTS:____

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GPA__________

APPENDIX 10

PUBLIC SERVICE COMPANY OF NEW MEXICO

ASSOCIATE OF APPLIED SCIENCE

INDUSTRIAL MANAGEMENT

I.	ENGL 111	Freshman Composition I	3
	MGMT 110	Introduction to Management	3
	MGMT 140	Supervision	3
	MATH 115	Intermediate Algebra	3
	COSC 110	Intro to Data Processing	3
			15
II.	*ENGL 218	Technical Writing	3
	SPCH 111	Speech Communications	3
	or		
	SPCH 110	Public Speaking	3
	SEAD 117	Business Communication	3
	*MGMT 214	Principles of Human Relations	3
	ECON 251	Macroeconomics	3
			15
III.	ACCT 201	Fundamentals of ACCT I	4
	MGMT 270	Personnel Management	3
	MARK 210	Principles of Marketing	3
	MGMT 224	Industrial Safety	3
		Co-op	4
			17
IV.		Humanities Elective	3
	*MGMT 235	Labor Relations	3
	MGMT 242	Topics in Leadership	3
	BADM 230	Business Law I	3
		Co-op	4
			16
			63 Credits

* Prerequisite

APPENDIX 10-A

ASSOCIATE OF APPLIED SCIENCE

INDUSTRIAL MANAGEMENT

ARIZONA PUBLIC SERVICE

I.	ENGL 111	Freshman Composition I	3
	BADM 114	Introduction to Business	3
	MGMT 110	Introduction to Management	3
	MATH 115	Intermediate Algebra	3
	COSC 111	Introduction to Computers	3
			15
II.	*ENGL 218	Technical Writing	3
	SPCH 111	Speech Communications	
	OR		3
	SPCH 110	Public Speaking	
	MGMT 140	Supervision	3
	*MGMT 214	Principles of Human Relations	3
	INEL 111	Power Plant Fundamentals	3
		Humanities Elective	3
			18
III.	ACCT 201	Fundamentals of Accounting I	4
	MGMT 270	Personnel Management	3
	MGMT 224	Industrial Safety	3
	ECON 252	Microeconomics	3
	MGMT 280	Cooperative Education	4
			17
IV.	*MGMT 225	Labor Relations	3
	MGMT 242	Topics in Leadership	3
	MARK 210	Principles of Marketing	3
	SEAD 128	Office Management	3
	MGMT 280	Cooperative Education	4
			16

66 Credits

*Prerequisite

ERIC Clearinghouse for
Junior Colleges OCT 24 1986